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JULY

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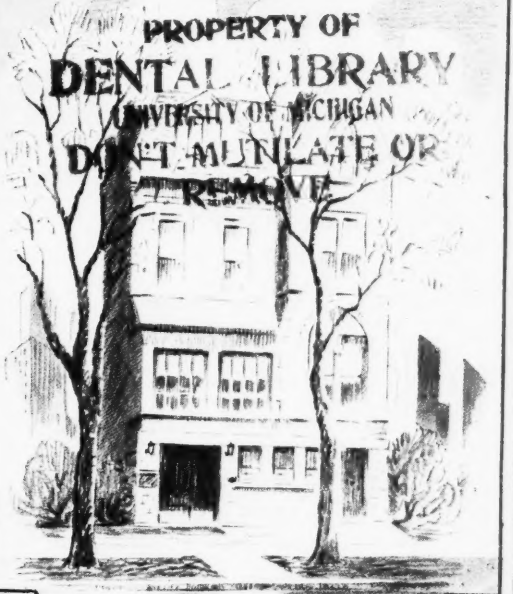

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August 7-12

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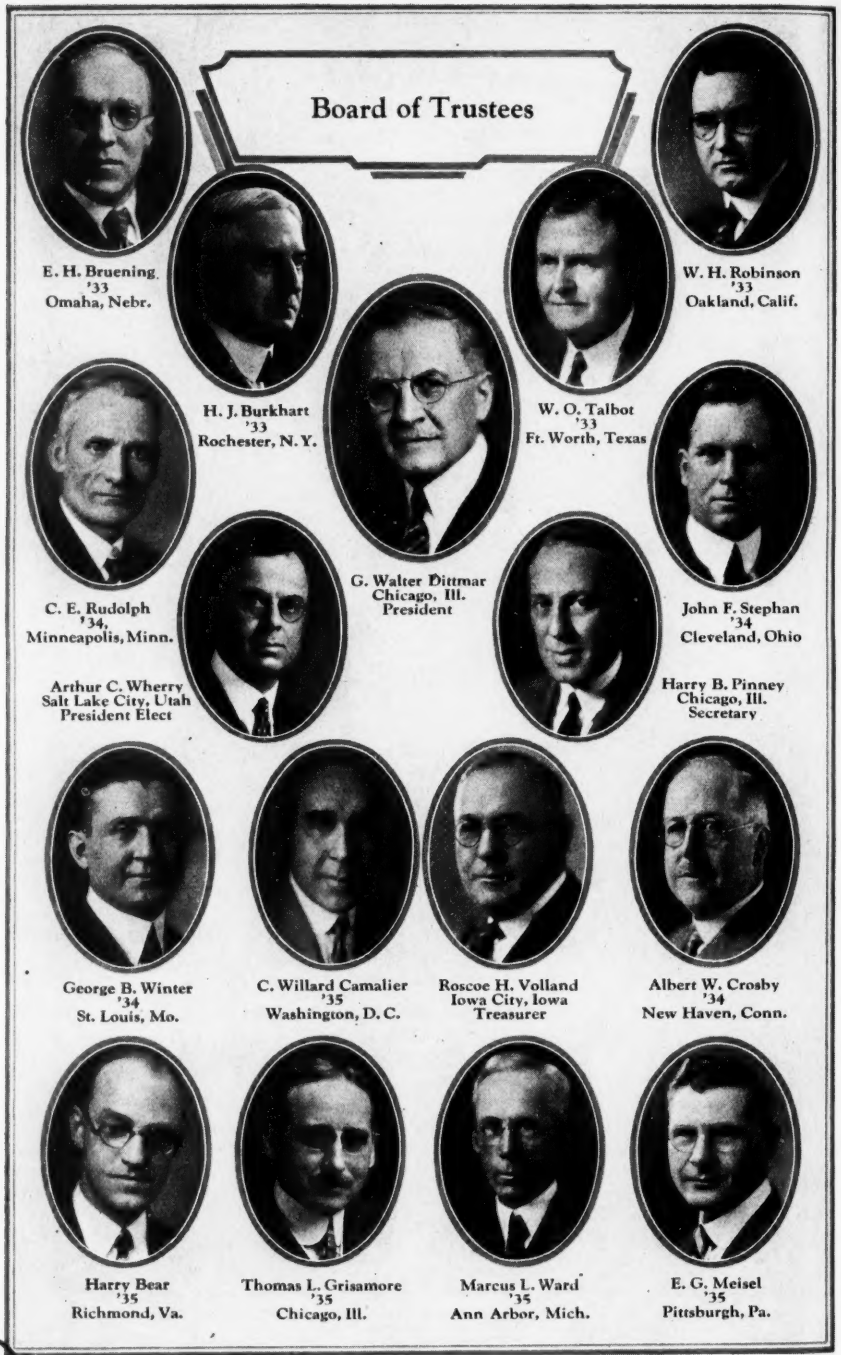

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THE JOURNAL
of the AMERICAN DENTAL ASSOCIATION

Vol. 20 JULY, 1933 No. 7

Original Communications

MOTTLED ENAMEL: THE PREVENTION OF ITS FURTHER PRODUCTION THROUGH A CHANGE OF THE WATER SUPPLY AT OAKLEY, IDA.

By FREDERICK S. McKAY, D.D.S., New York City

DURING the half dozen years just prior to 1925, the citizens of the small agricultural community Oakley, Ida., were becoming increasingly conscious that their children's teeth presented a disfiguring appearance. Of the nature and cause they were ignorant. They were equally conscious that this same condition did not exist in those children who resided just outside the town, but who came in daily to the school, nor among children in neighboring communities. Neither had they any knowledge at that time that there were any other places that presented a similar condition.

Inquiries addressed to various sources supplied the information that their condition was identical with that known to exist in many localities throughout the country and known as mottling of the enamel, embracing the various manifestations such as the stain, corrosion, and grayish flecking, as previously described in dental literature. It was at the same time made known to them that the collected evidence pointed conclusively to the water used for domestic purposes as the source of the condition.

About ten years earlier, the town had begun to use water for its domestic supply from a warm spring located about five miles outside in the hills. Six or seven years thereafter, this defect of the teeth made its appearance; whereas, prior to that time, it was unknown. The evidence associating the water supply with this dental defect was so convincing that a campaign was launched by the women's civic league of the town calling for a bond issue of $35,000 to finance a new water supply.

The warm spring water was for all usual domestic purposes perfectly satisfactory, odorless, agreeable to taste, clear and free from any detrimental organic pollution. To hold it responsible for this condition of the teeth was considered nothing less than fantastic; consequently, the proposed bond issue was vigorously opposed by leading influential citizens.

By invitation, and assisted by Dr. H. B. Smith, then of Oakley, I made an examination of the public school children, Feb. 9, 1925, which disclosed that every child in the community who had used the city supply during the period of enamel calcification had mottled enamel on every surface of every permanent tooth, and conversely that all children living outside the town were uniformly free from the defect.

Fig. 1.—Paper white case; no stain nor corrosion; old water supply. (Oakley, Ida.)

The evening before the election, I addressed a mass meeting of the citizens, who desired that the existing information as applied to other afflicted districts be made available to them as a means of determining their action relative to the election on the bond issue.

The bond issue was carried by a decisive vote, but equally important in their future plans was the matter of selecting a new water supply that would be safe from the standpoint of avoiding further production of this dental defect.

A certain cold spring located 3 or 4 miles from the warm spring was under consideration, but at that time the chemical constituent in the water that was responsible for the damage had not been identified. The only reliable evidence as to the safety of the new water in respct to this lesion of the enamel was derived from the children of a certain family who had used it during the period of calcification. The four children of this family presented enamel which was normal and this circumstance determined in a large measure the selection of that water.[1]

Not only was the old water discarded, but the new water was selected on dental evidence.

Fig. 2.—Stained case; no corrosion; old water supply. (Oakley, Ida.)

July 1, 1925, approximately five months later, the new water was turned into the pipes.

During the seven and a half years since then, Oakley has been looked on as an experiment station that would give the final answer as to the causative relationship between water and the production of mottled enamel.

In the reexamination, made Feb. 6, 1933, I was assisted, as in the original

1. McKay, F. S.: Mottled Enamel: a Fundamental Problem in Dentistry, D. Cosmos, 68: 847-860 (Sept.) 1925.

examination, by Dr. Smith, now of Jerome, Ida. This circumstance was fortunate in that my observations could be confirmed by one who had been for many years familiar with this lesion and familiar also with the conditions existing at Oakley at the original examination.

In approaching this examination, it was understood that no change was expected in the mottled condition of the teeth of the older children who had used the former warm spring water during the calcification period. It has been amply explained in previous writings that this damage once inflicted is subject to no improvement through later changes in the water supply or through other dietary changes. It is readily apparent, therefore, that the chief evidence relating to this change of water would be derived from the children who had been born at about the time of the change or afterwards, and who at the time of the reexamination had any of the permanent teeth erupted.

Fig. 3.—Stain with some pitting; old water supply. (Oakley, Ida.)

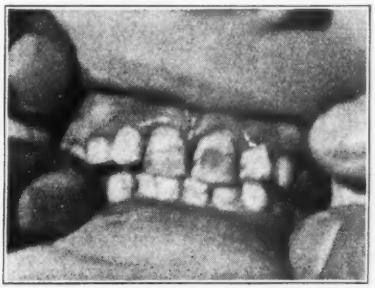

Fig. 4.—Corrosion; old water supply. (Oakley, Ida.)

The children, all of whom had used the new city water, were arranged in groups, and the data tabulated according to the ages that had been attained at the time of the change, as follows: Group 1. Eight children born one and a half years after the change presented twenty-eight permanent teeth, all with normal enamel. Group 2. Two children born six months after the change presented eighteen permanent teeth, all enamel being normal. Group 3. Fourteen children born at about the time of the change presented 115 permanent teeth, all enamel being normal. Group 4. Eleven children who had reached the age of about 6 months at the time of the change presented 121 normal permanent teeth. In two children of this group, there were certain other teeth that were slightly mottled. One of these children showed a slight mottling of the four first permanent molars and upper permanent central incisors. The other child showed a suggestion of mottling on the lower first permanent molars. Group 5. Three children who had reached the age of about 1 year at the time of the change presented thirty-seven permanent teeth, all enamel being normal. Group 6. Fifteen children who had reached the age of about 1½ years at the time of the change presented 185 normal permanent teeth. In two children of this group, there were certain other teeth that were slightly mottled. In one of these, there was a somewhat general distribution of a very slight mottling on certain molars, incisors and bicuspids. In

TABLE 1. — REEXAMINATION AT OAKLEY, IDA., FEB. 6, 1933

Case	Age at Time of Change	Number of Normal Teeth	Mottled Teeth
1	Born 1½ years after change	2	None
2	Born 1½ years after change	3	None
3	Born 1½ years after change	7	None
4	Born 1½ years after change	1	None
5	Born 1½ years after change	2	None
6	Born 1½ years after change	6	None
7	Born 1½ years after change	4	None
8	Born 1½ years after change	3	None
9	Born 6 months after change	11	None
10	Born 6 months after change	7	None
11	Birth	6	None
12	Birth	10	None
13	Birth	6	None
14	Birth	9	None
15	Birth	13	None
16	Birth	6	None
17	Birth	5	None
19	Birth	10	None
20	Birth	9	None
21	Birth	10	None
22	Birth	10	None
23	Birth	6	None
24	Birth	9	None
25	Birth	6	None
26	6 months	12	None
27	6 months	4	First molars and upper central incisors slightly
28	6 months	12	None
29	6 months	12	None
30	6 months	10	Lower first molars, slightly
31	6 months	12	None
32	6 months	10	None
33	6 months	10	None
34	6 months	12	None
35	6 months	15	None
36	6 months	12	None
37	1 year	12	None
38	1 year	12	None
39	1 year	13	None
40	1½ years	12	None
41	1½ years	12	None
42	1½ years	12	None
43	1½ years	12	None
44	1½ years	12	None
45	1½ years	16	None
46	1½ years	19	None
47	1½ years	12	None
		426	

TABLE 1.—REEXAMINATION AT OAKLEY, IDA., FEB. 6, 1933 (CONTINUED)

Case	Age at Time of Change	Number of Normal Teeth	Mottled Teeth
		(426)	
48	1½ years	12	Incisal edges and cusps, slightly
49	1½ years	12	None
50	1½ years	11	None
51	1½ years	8	Lower molars, slightly
53	1½ years	12	None
54	1½ years	12	None
55	1½ years	11	None
56	2½ years	26	None
57	2½ years	12	Upper central incisors and lower molars, slightly
58	2½ years	15	None
59	2½ years	12	None
60	2½ years	12	Upper and lower central incisors and 4 first molars, slightly
61	2½ years	11	Upper central incisors, migratory individual
62	2½ years	17	None
63	2½ years	10	Upper central incisors, slightly
64	2½ years	15	None
65	2½ years	12	None
66	2½ years	12	None
67	3½ years	17	First molars, upper central incisors, lower second bicuspids
68	3½ years	14	Central incisors
69	3½ years	15	None
70	4½ years	6	Lower six front teeth normal, slightly but generally affected
71	4½ years	3	General, but not pronounced
72	4½ years	2	General, but not pronounced
73	4½ years	22	Slight, central incisors
74	4½ years	2	Upper central and lower incisors, 4 first molars
75	4½ years	2	General
76	4½ years	13	Certain teeth mottled, migratory individual
77	4½ years	13	First molars, slightly
78	4½ years	1	General
79	4½ years	8	General
80	5½ years	..	General
81	5½ years	..	General
82	5½ years	..	General
83	5½ years	..	General
84	5½ years	2	General
85	5½ years	..	General
86	5½ years	2	General
87	5½ years	16	Slight
88	5½ years	2	General
89	5½ years	..	General
90	5½ years	22	Certain teeth mottled, migratory individual
		820	

TABLE 1.—REEXAMINATION AT OAKLEY, IDA., FEB. 6, 1933 (CONTINUED)

Case	Age at Time of Change	Number of Normal Teeth	Mottled Teeth
		(820)	
91	5½ years	14	Incisors
92	6 years	26	None
93	6 years	..	General
94	6½ years	4	General
		864	

the other child only the lower molars were slightly involved, the rest of the erupted permanent teeth being normal.

In all of the exceptions in the foregoing groups, the damage was so slight that close scrutiny was necessary to detect it.

With the increase in the ages attained by the following different groups of children at the time of the change of water, we found a general increase in the occurrence of mottling of the enamel.

Of the group of eleven who had attained the age of 2½ years at the time of the change, presenting 154 normal permanent teeth, four showed the defect, limited in each case to the central incisors and first molars. In one of these, only the upper central incisors and lower first molars were affected; in another, the upper and lower central incisors and four first molars; in another, who had been migratory, only the upper central incisors, and in the fourth, only the upper central incisors. In each of these the damage was very slight, the rest of the teeth being normal.

There were three in the group that had reached the age of 3½ years at the time of the change, presenting forty-six normal permanent teeth. Two of these showed damage which was distributed as in the preceding group, on the central incisors or first molars, or both, and in one the lower second bicuspids were included. The rest of the teeth were normal.

As to the group of ten that had reached the age of 4½ years at the time of the change, everyone showed mottling in some degree on some teeth, but this group presented seventy-two permanent teeth that were normal.

The remaining fifteen children examined had reached the ages of from 5½ to 7½ years at the time of the change, and all showed the defect on some teeth. In eight of these, there was a total of eighty-eight normal teeth; while in the remaining seven, there were no erupted teeth that were not mottled in some degree.

This article deals with a total of ninety-two children in the grade school who presented 864 normal permanent teeth, as shown in Table 1.

One case of particular interest was that of a high school pupil who had reached the age of 11½ years at the time of the change. All teeth of this individual excepting the third molars had been formed during the use of the old water and were typically mottled. The third molars were formed after the change and these were normally calcified. This was the only pupil in the high school who

had any third molars erupted, and it can with reason be assumed that, at another examination a few years later, other similar cases would be found.

In conducting this examination, our efforts were to record the conditions found with the utmost impartiality and with the strictest regard for accuracy. All teeth that exhibited the slightest evidence of the enamel defect were classed as being mottled. With this in mind, it will be apparent that a great many teeth considered as mottled and so recorded on our charts were to all intents and purposes normal, except as contributing to this survey.

The typical conditions produced by

Fig. 5.—Corrosion; old water supply. (Oakley, Ida.)

the use of the old water supply, as observed at the original examination in 1925, are illustrated by Figures 1-12.

It was of particular interest to observe children in whom there had been a period of enamel development that overlapped the change of water supply. On many teeth, there could be seen a sharp line of demarcation between enamel that was mottled and that which was practically normal. These lines could be interpreted as corresponding with the time of the change of water. Two such cases are shown in Figures 16 and 17.

The maximum amount of damage sustained by any individual examined who had overlapped the change of water is illustrated by these photographs and, in addition, Figures 18 and 19, which demonstrate that the degree of damage is slight in comparison with the effects of the old water.

In the sense that, in many of the younger children, no teeth had erupted other than the first molars and some of the incisors, our examination was premature. During the next three or four years, many bicuspids and second molars will have erupted which, without question, will be found to be normal.

The volume of evidence at this time is sufficient in amount to show conclu-

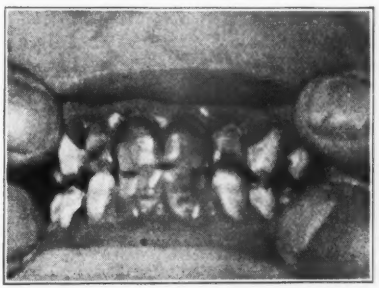

Fig. 6.—Pitting and some stain; old water supply. (Oakley, Ida.)

sively that the further production of mottled enamel at Oakley has definitely and positively ceased since the change in the water supply.

During the interim between the original examination and that recently made, the relation between fluorine in the water and the occurrence of mottled enamel as first announced by Churchill[2] had be-

2. Churchill, H. V.: A talk given before the Water Section of the American Chemical Society, abstr. J. Indus. Eng. Chem., 9:105 (April 10) 1931: Occurrence of Fluorides in Some Waters of the United States, J. Indus. Eng. Chem., 23:996-998 (Sept.) 1931; J. Am. Water Works A., 23:1399-1407 (Sept.); J. D. Res., 12:141-148 (Feb.) 1932.

TABLE 2. — FLUORINE CONTENT OF WATERS OF MOTTLED ENAMEL DISTRICTS EXAMINED TO DATE

	Fluorine Parts per Million	Fluorine Parts per Million	Fluorine Parts per Million
Ajo, Ariz., city water	5.8	.....	.....
Arlington, Ariz., private well	2.7	.....	.....
Artesia, Ariz., private well	6.0	.....	.....
Aztec, Ariz., railroad well	12.0	.....	.....
Bouse, Ariz., private well (J. Magin)	7.2	.....	.....
Buckeye, Ariz., city, railroad and private wells, respectively	2.3	2.4	5.5
Concha, Ariz., private well (Ortega)	7.5	.....	.....
Douglas, Ariz., city supply	5.2	.....	.....
Duncan, Ariz., school well and private well (Cosper)	8.1	7.3	.....
Florence, Ariz., city, private and private wells, respectively	2.7	2.9	4.8
Gila Bend, Ariz., railroad and school wells	10.6	5.6	.....
Hayden, Ariz., city supply, railroad (spring) and Pinal wells	3.0	2.9	7.5
Kelvin, Ariz., city supply, private well (J. Sells)	3.7	2.8	.....
Laveen, Ariz., school well and private well	2.5	4.5	.....
McNeal, Ariz., private well (A. Stukel)	3.0	.....	.....
Mammouth, Ariz., public well (C. C. Clark store)	6.0	.....	.....
Mesa, Ariz., Chapman well, Standage well	3.1	2.9	.....
Oracle, Ariz., private well (R. Gonzales)	3.0	.....	.....
Parker, Ariz., city, Indian agency and private wells	3.2	3.2	5.2
Phoenix, Ariz., Roosevelt school district	3.5	.....	.....
Pomerene, Ariz., private (East, Lofgreen and Fenn)	7.5	3.5	6.0
Roll, Ariz., school and private well (Sanguinetti)	3.3	8.7	.....
St. David, Ariz., private wells (A. J. Busby and B. Goodman)	11.2	12.6	.....
St. David, Ariz., private wells (Riggs and R. Curtis)	6.6	4.3	.....
St. Johns, Ariz., city spring water and private well	2.2	7.3	.....
Sacaton, Ariz., Casa Blanca school and Indian well	6.5	5.1	.....
Safford, Ariz., private well (Layton)	3.0	.....	.....
San Simon, Ariz., railroad (shallow) and school (artesian)	9.8	5.3	.....
San Xavier, Indian Reservation	3.0	.....	.....
Sentinel, Ariz., railroad and private well	7.7	9.3	.....
Solomonville, Ariz., private well (F. Blake)	3.8	.....	.....
Wellton, Ariz., L. Spain, railroad and radium wells	3.7	3.3	12.5
Willcox, Ariz., high school and private wells (Scott)	2.4	3.3	.....
Winkelman, Ariz., city supply	2.8	.....	.....
Yuma, Ariz., private well (Jones) and N. Gila (school)	3.2	9.1	.....
Bauxite, Ark., (deep well)	13.7	.....	.....
Conway, S. C.	6.6	.....	.....
Colorado Springs, Colo.	2.0	.....	.....
Lidgerwood, N. D.	11.0	.....	.....
Kidder, S. D.	12.0	.....	.....
Wilson, Ida.	16.8	11.5	.....
Ankeny, Iowa	10.0	15.0	.....
Chetopa, Kan.	9.85	8.32	.....
Lordsburg, N. M.	5.6	.....	.....
Talent, Ore.	9.1	.....	.....

come definitely established, largely through the work of Smith and her associates at the University of Arizona.[3]

From these studies, we are able to say that the danger line in the fluorine content of water is not far from two parts per million, the waters from endemic districts thus far tested carrying amounts varying from just below two up to almost seventeen. There have been no exceptions in seventy-four tests that have been available up to the present time, most of these having been furnished by Smith through her statewide survey of Arizona. These are listed in Table 2.

The former supply at Oakley, which was responsible for an affliction of 100 per cent of its users, was tested by Churchill at the laboratories of the Aluminum Company of America, New Kensington, Pa. The result showed six parts per million of fluorine.

The new water, which is associated with complete immunity from mottling of enamel, has been determined also by Churchill to contain less than one-half of one part per million of fluorine. I desire to state that this determination was made without any knowledge by the

Fig. 7.—Pitting; old water supply. Oakley, Ida.)

Fig. 9.—Pitting; old water supply. (Oakley, Ida.)

Fig. 8.—Corrosion; old water supply. (Oakley, Ida.)

Fig. 10.—Pitting; old water supply. (Oakley, Ida.)

3. Smith, Margaret C.; Lantz, Edith M., and Smith, H. V.: Cause of Mottled Enamel, a Defect of Human Teeth, Tech. Bull. No. 32, University of Arizona, June 10, 1931. Smith, Margaret C.: Mottled Enamel in Arizona and Its Correlation with Concentration of Fluorides in Water Supplies, Tech. Bull. No. 43, University of Arizona, July 15, 1932. Smith, Margaret C., and Lantz, Edith M.: Experimental Production of Mottled Enamel, Tech. Bull. No. 45, Jan. 1, 1933.

examining chemist of the results of the recent examination at Oakley. Neither was it known to me until after the examination at Oakley had been completed.

The record of this unique experiment in that community is offered as the final evidence, after twenty-five years of research, in completing the proof of the causative relation between fluorine in the water and the occurrence of mottling of enamel.

Fig. 11.—Pitting; old water supply. (Oakley, Ida.)

Fig. 12.—Extreme corrosion; old water supply. (Oakley, Ida.)

The Oakley experience has provided a definite procedure for the future protection of those communities in many of our states and in other countries which this problem has hitherto baffled, and likewise for communities and the multitude of individual isolated families contemplating the installation of or additions to their water supply.

It furnishes, at the same time, strong support to the conviction that disturbances of the integral structure of enamel, as regards the degree of its perfection in calcification, are not brought about by withholding materials that are thought to be essential, but rather through the presence of a disrupting or disturbing element of specific toxic influence.

It was not that the old water at Oakley failed to contribute some element necessary to the proper calcification of the enamel, but rather that it did contribute something that interfered with or prevented proper calcification.

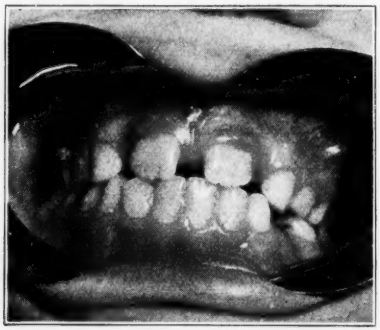

Fig. 13.—Teeth of child, 8 months old, when water was changed. The incisors are normal except for the upper central, which are very slightly mottled on the incisal fourth. The first permanent molars are slightly mottled on cusps. (Oakley, Ida.) Figures 14-15 illustrate the normality of enamel calcification associated with the use of the new water as observed at the recent reexamination.

On the other hand, it was not that the new water contributed something that was essential to the calcification process, but rather that the element that would disrupt that process was not present, the rest of the diet remaining the same under both conditions.

The effect of fluorine on calcified animal tissues has been the subject of a great many laboratory experiments as recorded in the literature of biologic chemistry and nutrition, but its application to human physiology has never before been so closely approached as in this study of mottled enamel. As a result, it is acquiring the distinction of being almost a new subject in biologic research, particularly as to its presence in potable waters, in which respect, the attention given to it heretofore has been almost negligible.

A recent article by Sharpless and McCollum[4] which discusses the wide distribution of this element in nature and its general inclusion in foodstuffs raises

Fig. 14.—Teeth of child, 6 months old when water was changed; enamel normal. (Oakley, Ida.)

Fig. 15.—Teeth of child born six months after change of water; enamel normal. (Oakley, Ida.)

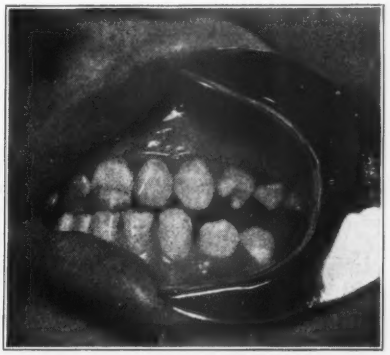

Fig. 16.—Teeth of child, 5½ years of age, when water was changed. A line of demarcation may be noted on the lower second bicuspid. (Oakley, Ida.)

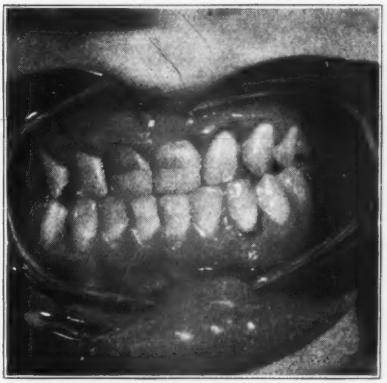

Fig. 17.—Teeth of child, 4½ years of age, when water was changed. The line of demarcation may be noted on the lower incisors. (Oakley, Ida.)

4. Sharpless, G. R., and McCollum, E. V.: Is Fluorine an Indispensable Element in the Diet? J. Nutrition, 6: 163-178 (March) 1933.

the question as to whether it is an indispensable element in the diet in any concentration, and presents some evidence to show that it is not. They say,

> Fluorine is the most active, chemically, of the elements. It is widely distributed in soils, rocks, and waters, being estimated to constitute 0.1 per cent of the first half mile of the earth's crust, land and sea. It is placed twentieth in order of abundance among the elements in the surface half mile of the earth. In certain spring and well waters it is so abundant as to cause mottling of the enamel of the teeth of persons drinking such waters while the enamel is forming. Fluorine is apparently universally present in plant and animal tissues. The question is still unanswered as to whether the element plays a physiological rôle or is present in the tissues as an accidental constituent because it is ingested in all food.

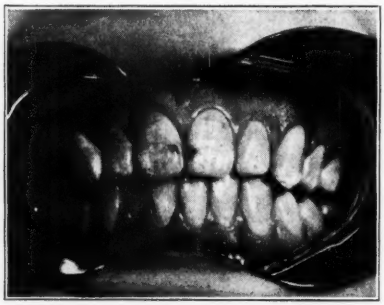

Fig. 18.—Teeth of child, 5½ years of age, when water was changed. (Oakley, Ida.)

The experiments reported by them were to "determine whether satisfactory nutrition can be secured during growth and reproduction with diets depleted as far as possible in fluorine."

The effects of excess fluorine feeding are recognized by these authors as manifesting themselves first and in the most important way on the teeth. In this conclusion they are in accord with the findings in this research on mottled enamel, for, as far as is apparent at the present time, there seem to be no tissues in the human being, except the enamel, that are damaged.

Among their conclusions, following their experiments on rats, we note the following as bearing most directly on our subject matter.

> Rats grow normally on a diet low in fluorine; a diet low in fluorine does not affect reproduction in any way; the fluorine content of the bones can be reduced to between six and twenty-five parts per million and can be eliminated from the teeth, insofar as can be determined, without showing any gross deleterious effect; there is no striking structural change in teeth free from fluorine from rats on a low fluorine diet.

It would seem then that although much is made of the fact of the presence of fluorine in analyses of enamel, it is not considered as a necessary element.

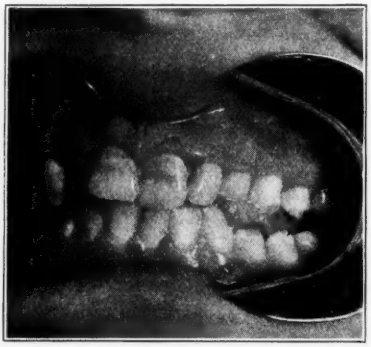

Fig. 19.—Teeth of child, 6½ years of age, when water was changed. (Oakley, Ida.)

The constant dosage of fluorine in water in these extremely attenuated concentrations may express itself in mild pathologic lesions of other tissues which, through their inherent vital functions, may be coincidentally repaired. No such function resides within the enamel, as is well understood by dental science. The disturbing influence of fluorine on the process of enamel calcification is never offset; hence, this lesion of the

enamel remains as the only index of the toxicity of that element for the individual.

The mildness of the lesion which was observed in the cases overlapping as regards the change of water at Oakley can be taken as an index of the degree of damage inflicted by the old water supply. The condition remains as established after the withdrawal of the fluorine formerly contributed by that supply. To state that there had been any recuperation or repair process in the enamel following the withdrawal of fluorine would be the merest conjecture.

It is equally conjectural to assume that there may have been a storing up of the fluorine influence during the use of the old water, which gradually faded out, or was exhausted, after the abandonment of that supply.

Christiani and Gautier[5] report that fluorine tends to accumulate in the bones of guinea pigs, producing a definite pathologic disturbance, but evidence presented by Smith[6] indicates a sharply defined demarcation in the lesion corresponding to the withdrawal of fluorine.

These conjectures should not be dismissed, but rather taken as guides in future study. In reaching the conclusions arrived at with reference to the relation between fluorine and this defect of enamel calcification, the inquiry is by no means ended. It is not far from the truth to say that it has practically ceased to be a problem that concerns dental science alone, but it is emphatically true that it has become one that is seriously important to waterworks engineers and nutrition chemists. For these, it raises a problem that is entirely new and without precedent.

Neither does it stop there. There is a growing feeling that this inquiry has a place within agriculture and horticulture, some indications having been expressed that water containing fluorine in certain concentrations is injurious to plant cells when used for irrigation.

With further reference to dental science, it sets forth certain broad general principles relating to enamel development, the necessity for an accurate understanding of which was never more apparent than at the present day in the face of the commercial exploitation to which our profession is being subjected.

It is a matter of common observation that through the use of a diet conforming to an average balance of essential ingredients, enamel calcification proceeds in an orderly fashion, and is not subject to specific aberrations as to normality of structure; whereas, it is made to appear that unless certain constituents are present, defects of structure, particularly in reference to the degree of calcification, are apt to be present.

As far as has yet been made apparent, mottling is the one outstanding lesion of the enamel that is traceable to a specific error in the diet, and, as has been shown, this has been produced by the presence of a particular substance, fluorine, in the water. It would be distinctly informative if any lesion of the enamel could be presented that could be traced definitely to the absence of any particular essential ingredient of the diet.

It is gratifying to note that the importance of this problem of the effect of fluorine has been so largely demonstrated through the perception of dental science, in having acquired this expansion in its application to human welfare.

2 East Fifty-Fourth Street.

5. Christiani, H., and Gautier, R.: Comp. rend. soc. biol., 92: 139-141, 1925.

6. Smith, Margaret C., and Lantz, Edith M.: Experimental Production of Mottled Enamel, Tech. Bull. No. 45. University of Arizona, Jan. 1, 1933.

CLINICAL OBSERVATIONS ON AREAS OF EROSION AND THEIR RESTORATION*

By W. I. FERRIER, D.D.S., Seattle, Wash.

DENTAL erosion, according to one authority, is the gradual disintegration of enamel in areas more or less clearly defined without the incidence of caries. Its etiology seems to be shrouded in mystery. The research of earlier investigators is, as reported, as confusing as the term itself.

Miller gives the following definitions:

Erosion (e & rodere—to eat away) refers to the superficial chemical disintegration of tooth substance.

Abrasion (ab & rodere—to rub off) is a slow and gradual wasting away of tooth tissue by friction.

I do not wish to cause confusion by changing a nomenclature that has been used for many years; but, to be exact the condition that I refer to might better be classed as abrasion. So much of the dental nomenclature has been changed lately that it becomes difficult for the graduates of earlier years to converse with familiarity in the newer terms or to express in writing the meaning that they wish to convey. To the large majority, the wasting away of a tooth at the neck in a definite wedge-shaped manner, leaving a smooth polished surface, is known as erosion, and, for the purposes of this paper, these areas will be known as such.

C. Edmund Kells was of the opinion that "absolutely nothing is known about erosion and nowhere can we turn for advice as to its prevention or treatment." And he adds: "In the presence of erosion, the dental profession is absolutely helpless and the case is hopeless."

Nearly half a century ago, Dr. Kirk wrote on the etiology of erosion, stating that dental erosion was "a constitutional disorder with a local manifestation and that the local expression was the solvent action upon tooth structure of an altered mucus from certain buccal glands; that the nature of the solvent was unknown but that some constitutional difficulty was back of this local condition which caused these glands, in their abnormal state, to exude an acid instead of an alkaline neutral mucus."

Nearly thirty years ago, Dr. Kirk, after a comparative crystalline analysis of the salts of the saliva, expressed the belief that one case of general erosion of a highly destructive nature which he investigated was caused by the presence of lactic acid as the active solvent agent and that localized cases are produced by abnormal mucus exudate containing either acid sodium phosphate (H_2NaPo_4) or acid calcium phosphate (H_2CaPo_4). It was probably in reference to this type of erosion that Dr. Kells made the foregoing statement; but there is a type of erosion, and that the one most prevalent, the etiology of which is fairly clear, and it is this that will be considered here.

*Read before the Section on Operative Dentistry, Materia Medica and Therapeutics at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 15, 1932.

Probably the most laborious and exhaustive experiments ever undertaken to explain the causes of erosion were made by W. D. Miller, of Berlin, and published in the *Dental Cosmos,* beginning in January, 1907. His method of experiment was to simulate mouth conditions as nearly as possible in the laboratory and to attempt to produce erosion by the use of toothbrushes and the pastes and powders popular at that time. Teeth were conveniently arranged for brushing by a machine that would do in a few hours the work that was necessary during a lifetime to keep the teeth clean. This time was estimated with fair accuracy.

Fig. 1.—Type of erosion etiology of which is unknown.

To make the conditions more nearly normal, hand brushing was resorted to with innumerable preparations, varying in abrasive properties. A proper ratio of time was calculated between the estimated time consumed by an individual in brushing his teeth over a period of years, and the laboratory time necessary to produce similar conditions. Weak solutions of acids and alkalis were used in conjunction with the abrasive materials. Other experiments with currents of various solutions, too long to be described here, were made. Dr. Miller and his assistant together worked sixteen hours a day for a year, so exhaustive was the research. Ten thousand hours in all were consumed and the work was not then complete.

Every known form and type of wasting of tooth structure was produced by this abrasive method, and the conclusions reached, as I interpret them, were that wasting of tooth structure was caused by the abrasive action of powders and pastes in conjunction with the toothbrush in most cases. Not erosion as it is commonly known, but a true abrasion. Nevertheless, for reasons before stated, I shall term this condition one of erosion. These experiments were made so painstakingly and accurately that further research along these lines, had one the

Fig. 1.—Type of erosion etiology of which is unknown.

time and inclination, would be a duplication of effort.

Notwithstanding the fact that more theories have been advanced as to the etiology of erosion than is perhaps true of any other dental disorder, and yet no explanation that has been made is acceptable to even a part of the profession, clinical evidence bears out the conclusions reached by Dr. Miller that, in a large percentage of cases, erosion, so-called, is a self-inflicted disease, the result of a misguided effort on the part of the patient to keep the mouth and teeth clean. There is a type of erosion the cause of which has never been satisfac-

torily explained. This will be given but brief mention in order that there be no misunderstanding as to the type under consideration in this paper. I refer to that form of wasting which may occur on the surface of any tooth, usually on the labial, buccal and lingual surfaces. It may appear at any time in life and makes rapid progress in cupping and grooving the teeth in irregular and fantastic shapes. (Figs. 1-3.) There is no reference to this kind of wasting in the preceding remarks nor in those which are to follow. It is the sharp wedge-shaped areas occupying the gingival third of teeth that are of interest here, because of the frequency of their appearance in the best kept mouths. The etiology of this type is clear. (Figs. 5-6.)

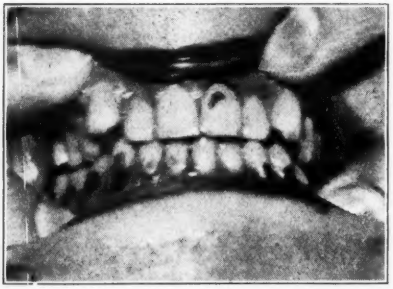

Fig. 3.—Type of erosion etiology of which is unknown.

Although I have perused much of the available literature on this subject, I have been unable to find direct mention of a clinical picture that presents itself in nearly all mouths afflicted with erosion; which to me gives convincing proof that most erosion is caused by the use of abrasive powders and pastes in scouring the teeth with a brush. This erosion is more extensive and the wasting more advanced on the left side of the mouth in right-handed people; the erosion less extensive and wasting less advanced on the left side in left-handed people. The reason is clear: Better leverage is obtained on the teeth on the left side of the mouth by right-handed people with the cross-brushing methods that produce erosion. The opposite is true for those who brush the teeth with the left hand. This result is so nearly universal that not infrequently I can determine whether a patient is left or right-handed by examination of two weeks, not one case presented have I found reference to this theory.[1] A condition of wasting so obvious must surely have been observed by many, but little has been written concerning this evidence of the cause of erosion.

The frequency of occurrence of erosion is alarming, deserving more consideration than it has in the past received. It occurs only in the best kept mouths. (I have never observed it in an ill-kept or neglected mouth.) In a recent clinic held for instruction in gold foil technic for twenty-six graduates for the duration of two weeks, not one case presented for treatment showed erosion present. People who are seeking free dental service usually have ill-kept mouths, and although many cases of caries in the gingival third

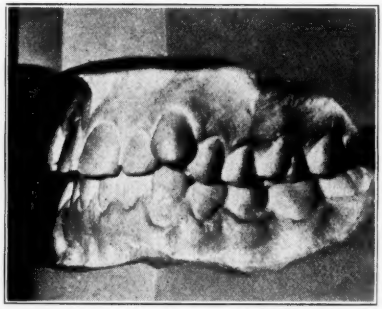

Fig. 4.—Type of erosion etiology of which is unknown.

1. Erosion, D. Surgeon; quoted in New Zealand D. J., 23:95 (Jan.) 1928.

of teeth were treated, erosion was conspicuous by its absence. But in the average well-established practice, erosion occurs in about 20 per cent of teeth requiring filling.

To determine the frequency of occurrence of eroded areas, I requested a study club of twelve men, with whom I have been associated for a number of years, to compile data on their gold foil operations for the past six to ten years. While the results of their information here given are not absolutely correct, a good basis on which to make an estimate is afforded. In many Class II cavities, inlays are indicated, but, to offset this,

RECORD OF TWELVE THOUSAND COLD FOIL OPERATIONS

I	II	III	IV	V
10.0	5.0	50.0	0.0	3.50
9.4	23.5	27.3	5.4	34.4
4.0	5.0	52.0	3.0	36.0
6.3	9.6	40.5	9.7	33.9
35.0	5.0	40.0	5.0	15.0
20.0	14.0	27.0	3.0	36.0
15.0	4.0	43.0	4.0	34.0
12.0	4.0	30.0	2.0	52.0
54.0	7.0	14.0	5.0	20.0
6 8	14.6	50.0	4.6	24.0
172.5	91.7	373.8	41.7	320.3
17.25%	9.17%	37.3%	4.17%	32.03%

many Class V cavities of erosion call for porcelain inlays. As these men mentioned above are known as gold foil operators and give particular attention to operative dentistry, I felt that, from them, fairly accurate data on eroded areas could be obtained.

The accompanying table represents an accurate record of about 12,000 gold foil operations of the past six to ten years. Some of the reports covered six years and some ten years.

You will observe from this tabulation that 32.03 per cent of all these operations were carried out on the gingival third of the buccal and labial surfaces of teeth, and nearly all in fairly well-kept mouths, where decay does not frequently occur on these surfaces, but erosion does. Taking into consideration the Class II cavities in which inlays were placed instead of gold foil, I should judge that a fair estimate of the frequency with which erosion occurs in the mouths of people who care for their teeth, would be in about 20 per cent of all cavities.

Dr. Black, in his writings on erosion and abrasion, gave us many possible causes, but he says: "Finally I can not at present find any theory proposed that has not features that seem to render it impossible. I, therefore, feel compelled to leave the subject in this very unsatisfactory condition, hoping that an early solution of the difficulty may be discovered." I think the wedge-shaped or V-type of erosion can be explained, but notwithstanding all the research covering this period of time and its almost universal prevalence in the best kept mouths, erosion, as I have observed it, is on the increase; a situation that is alarming, but not amenable to much change, owing to the deep rooted habits of our people and the lack of agreement among ourselves as to the home care of the teeth.

I shall make no attempt to give a brushing technic. There are as many methods of caring for the teeth as there are toothbrushes. Most instructions are as difficult to follow as a diet. The instruments may range from a simple cotton roll to a number of odd-shaped brushes supplemented with floss and tape of various widths, and powders and pastes of various grits—the whole making an armamentarium and calling for a technic so complicated as to be used intelligently by few. It is, indeed, a careful and painstaking individual who can,

day after day, pass a ribbon of floss into a normal interproximal space and do no harm to the septal tissue. The same is true of the use of extremely hard bristles with the power and force frequently advocated. It is true that the resistance of the investing tissue may be built up to a high degree by long continued and vigorous brushing with an extremely stiff brush; which is desirable in mouths that have been afflicted with pyorrhea or other diseases that cause the loss of gum tissue.

In perfectly healthy mouths in which the septal tissue is full and normal, such

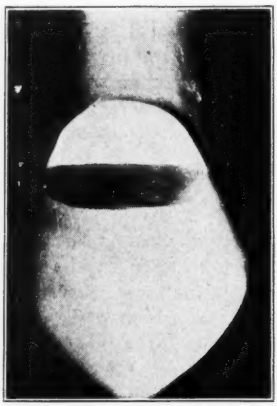

Fig. 5.—Sharp wedge shaped type of erosion, result of improper use of toothbrush with sharp and gritty pastes or powders.

a procedure will bring about conditions that are undesirable. I have observed septal tissue completely filling the interproximal space, forming long graceful curves, the tissue neither attenuated nor thickened, and affording the most beautiful picture we have of health and normality, which, in a few months of vigorous, heavy brushing, presented an entirely different picture. The septal tissue shows a grooving, not so clearly cut, but in general outline almost identical with the erosion in teeth that we have under consideration. The gum tissue becomes thickened and coarse in appearance as though the hard tissue underneath had been built up and enlarged, presenting a condition entirely out of harmony with that of the teeth themselves and destroying the pleasing appearance that once existed.

This is not a pathologic condition by any means, but quite the opposite, and even desirable in mouths that have a tendency to pyorrhea or those in which the disease has actually been present. It is not at all desirable in apparently healthy mouths with normal interseptal tissue. I, therefore, come to the conclusion that no one method, system or technic of

Fig. 6—Sharp wedge shaped type of erosion, result of improper use of toothbrush with sharp and gritty pastes or powders.

brushing is applicable to all individuals any more than one system of physical exercise is applicable to all. Each case presents a problem in itself. Normal gum tissue is not to be treated as abnormal or pathologic tissue, and vice versa.

We must all agree that any system that will cause this destructive erosion should not be taught and, I was about to say, should be discontinued by the individual; but here we meet with a stumbling block. Erosion that has been caused by a faulty brushing technic, used in conjunction with rough and gritty preparations, usually is observed at a time in life when habits are hard to break and hard to form. The very fact

that erosion is present is proof that the teeth have been brushed in an improper manner for a number of years; which makes the habit even more difficult to break. I have tried, in any number of cases, to make such changes as seemed necessary to prevent further erosion, but have almost always met with failure. Not failure as far as the erosion was concerned, as it would take a number of years to determine whether the instructions were being followed out and were well founded, as erosion does not take place over night, but follows a long continued process of habitual wear, as we have tried to show; but failure in the respect that the patient does not keep the teeth clean and the soft tissues properly massaged, these soon presenting an unkept, disease condition where, prior to corrective changes, there was cleanliness and health.

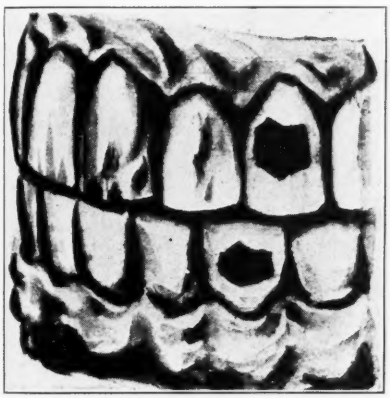

Fig. 7.—Erosion caused by brushing over period of years with baking soda. The labial and buccal surfaces of the gold crowns were cut through to the tooth structure.

In making these changes, the patient is breaking life-long habits at an inopportune time of life. He has become confused; his system that produced a clean mouth and had become habitual and automatic has been taken away from him. He is in a dilemma from which he does not easily extricate himself. Further instruction increases the confusion. If he is left to himself, his old habits will return, and perhaps it is best to let them return. He is far better off with a clean and healthy mouth, one in which further erosion may take place, than with an unclean mouth and the sequelae of uncleanliness. Little can be done with diseased investing tissue in an ill-kept mouth. The lost tooth structure can be restored permanently and in such a manner that erosion rarely takes place in these areas.

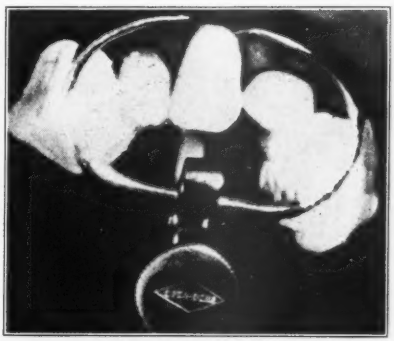

Fig. 8.—Application of rubber dam with modified Hatch clamp, supported by modeling compound.

The treatment of erosion consists in restoring the area with some kind of filling operation, veneers of gold or porcelain, and, in extreme cases, full mouth reconstruction. Figure 7 shows erosion in a mouth that it was necessary to reconstruct. The patient had long used baking soda as a scouring agent and not only were the natural teeth affected, but the gold crowns used for bridge abutments were cut through to the tooth structure. The labial enamel plates of the upper

six anterior teeth in their entirety and a considerable amount of the dentin had been literally brushed away. The incisal edges were thin and irregular, it being necessary to open the bite to restore them with porcelain jacket crowns. The occlusal surfaces showed only normal wear. This, of course, is an extreme case, but it serves well to illustrate the destructive influence of an abrasive used over a long period of time.

For the large percentage of eroded areas, gold foil is without question the best material to use in restoration. Certainly, the use of gold foil in these cases is not an original idea, but its use is not general, and only in a few sections of our country is it used, and by a comparatively few men. In the hands of these men, its application has probably reached the highest state of development.

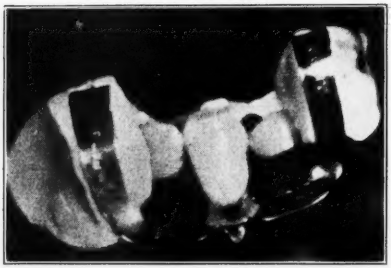

Fig. 9.—Application of rubber dam with "ivory" No. 9 clamp supported by compound.

I quote from a paper written in 1927 on the indications for gold foil. The indications as there given I have had no reason to change. They represent the observation and experience of more than twenty years devoted mainly to operative dentistry that gold foil may be used in more than 30 per cent of filling operations.

We should not tolerate any interference as to our choice of filling materials. Certainly our judgment should be best as to the materials and methods used in restoring lost tooth structure, but gold, in the past few years, has come to be in great disfavor in the anterior teeth because of its inharmonious color. It matters but little how great a display of gold we may make on other parts of the human anatomy, most people will not tolerate its use in the 6 anterior teeth and gold foil loses one of its best indications, or rather these teeth are fast losing their greatest remedial agent. Therefore, gold foil is contra-indicated in the anterior teeth, upper and lower, where its color makes it so conspicuous as to offend the esthetic sensibilities of the patient or his friends and acquaintances. For them, a material must be used that is more compatible in color with the tooth though it can-

Fig. 10.—Typical cavity preparation.

not compare in lasting qualities with gold foil. Porcelain inlays where indicated are, of course, to be preferred. Silicate cements are used in the great majority of cases and many times under an assumed name. At the risk of becoming tiresome to those with whom I have conversed on this phase of dentistry, I must repeat that I have never missed the opportunity, nor shall I now, of condemning the practice of inserting silicate cement fillings under an assumed name. It is unfair to those men who have so long labored to place the porcelain restoration where it is today; it is unfair to the patient and unfair to the profession of Dentistry. Surely silicates have their indications as all filling materials have. Place them where they belong and call them

by their proper name, silicate cements—they are not porcelains.

Despite the fact that gold foil has fallen into disfavor in the anterior teeth, there are many who have no objection to its use. These patients are usually in middle and late adult life, who desire the best material we have to save their teeth. For these very practical people, gold foil is indicated.

Furthermore, erosion is not confined to the anterior six teeth and foil is usually not conspicuous in the lower anterior teeth. Hence, it has a wide range of application.

The technic involved is a simple one. A proper application of the rubber dam (Figs. 8-9) gives us an excellent field of operation and an especially good opportunity to give the operation the fine

Fig. 11.—Modified type to follow curvature of gingiva.

finish necessary at the gingival margin which usually lies in cementum. Without its use, a filling of any kind in this position cannot be properly finished. (Fig. 10.) The cavity preparation is extended well out to the mesial and distal angles of the tooth; somewhat beyond the eroded area toward the incisal edge or occlusal surface and slightly beneath the gum. This includes all of the wasted area. The outline form is obtained by the use of a small inverted cone bur held endwise to the wall on which we are working. All the walls, except the occlusal, are shaped in this manner, and it is formed by the bur held at right angles to the axial wall. The axial wall is roughly formed in the same manner and the cavity is finished with a No. 5 hoe, an operation very simple and easily done.

As shown in Figure 10, the occlusal and gingival walls are parallel or slightly undercut to obtain retention; but the mesial and distal walls converge toward the axial wall, similarly to an inlay preparation. Their angles are of assistance in the starting of the gold, but they have little to do with retention in the finished operation. They are formed in this manner to give them strength to withstand

Fig. 12.—Placing first one eighth cylinder of noncohesive gold against distal wall.

the wedging of the gold. In the outline form, the angles are sharp and definite, being so made to coincide with the outline of the eroded area with the least possible cutting. (Fig. 10.) In cavities of decay, where the same preparation is used, the chalky and whitened enamel runs up along the mesial and distal angles of the tooth in fine lines, terminating in points that almost coincide with this cavity preparation. Thus, extension for prevention is obtained exactly where it is

wanted, with a minimum of cutting. (Fig. 11.)

In building the gold, noncohesive foil is used in conjunction with cohesive foil. A cylinder of noncohesive No. 4 foil consisting of one-eighth sheet is placed along the mesial wall, the end of the cylinder resting against the axial wall and wedged firmly to place with as little manipulation as possible. Care must be exercised in holding the cylinder with one instrument while wedging, as is shown in Figure 12.

In like manner, the distal wall is covered with a noncohesive cylinder. (Fig. 13.) The gingival wall is covered by introducing a one-eighth cylinder transversely across the cavity, one end resting on the gingival wall and the other touching the occlusal wall. (Fig. 14.) The occlusal half of the cylinder is now forced against the gingival wall and well into the axiogingival angle, securely locking the gold already placed. The occlusal wall is now treated in the same manner and the peripheral walls of the cavity are completely lined with noncohesive gold. (Figs. 15-16.)

The lining of these cavity walls with noncohesive gold affords a cushion to mallet the cohesive foil against, thereby protecting the margins and making it possible to complete the operation with less regard to the line of force used. Noncohesive foil is soft and has great wedging properties. A line of force slightly inclined toward each wall is all that is necessary.

A one-thirty-second pellet of annealed foil is now introduced between the cylinders and pressed lightly to place. (Fig. 17.) Another is placed in a similar manner and the two are malleted against the axial wall and into all the line angles, wedging and securing the noncohesive gold already placed. Successive pieces of various sizes are placed and malleted, care being taken to wedge the noncohesive gold against the cavity walls, pinching it off as the margins are

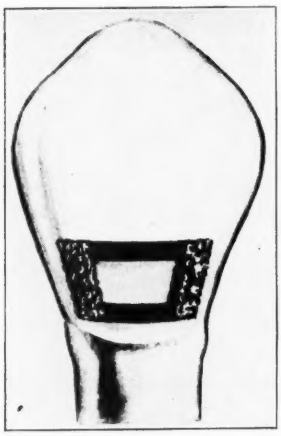

Fig. 13.—Mesial and distal walls lined with noncohesive gold.

Fig. 14.—Introducing one eighth cylinder noncohesive gold transversally across cavity to be forced gingivally, covering gingival wall and locking two cylinders already placed.

reached so that when the filling is built up, the noncohesive foil will be entirely covered by the cohesive foil. If some of the noncohesive is not covered with the cohesive foil, it matters little. Cohesive gold gives a finer finish and is desirable but not essential to a good operation. (Figs. 18-19.)

In finishing the filling, the bulk of the gold is best removed with files and the gingival overlap carefully removed with a sharp Wedelstaedt knife. At this point, great care must be used to avoid ditching the cementum below the margin

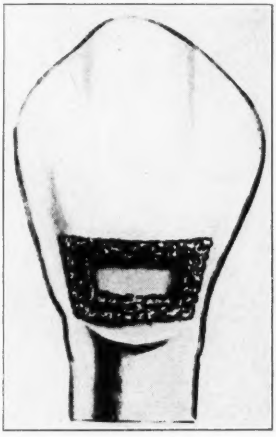

Fig. 15.—Peripheral walls of cavity completely lined with noncohesive gold foil.

of the filling. Disks must be used with caution at this point, but can be employed with more abandon on the other parts of the gold. Finally, a rubber cup charged with dry pumice is lightly rotated against the gold, and the operation is complete. The time consumed from start to finish should not be over one hour and fifteen minutes for the average operation by a gold foil operator of average ability. An operation that has no peer in the operative field completed in one appointment—and yet made use of by a comparative few.

DISCUSSION

John S. Dohan, Montreal, Canada: Dr. Ferrier, realizing that the subject of erosion as a whole was too broad to be covered at this time, dealt more specifically with one phase of the subject, the wedge-shaped areas in the gingival third of the teeth, which he believes should be classed as "abrasions." We find in nature that the chemical process of erosion, due to moisture and carbon dioxide, breaks up even rocks and minerals. Certain rock constituents are dissolved and borne away in suspension, helping the stream to carve a deeper channel. A similar process has been shown to occur in the human mouth, by the action of acid fluids, oxalates, etc., plus the pressure of the lips and cheeks, which assists in the polishing. G. V. Black, in describing erosion, said in part: "The area of

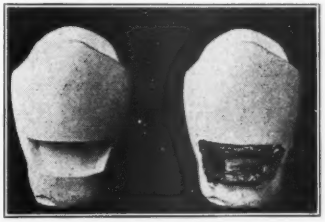

Fig. 16. Left: Cavity preparation. Right: Cavity lined with noncohesive gold foil.

the eroded surface is always smooth and glossy. So long as any facet on the labial and buccal surfaces of the teeth is hard, smooth and glossy, it may be classified as erosion." If we accept this definition, it may be assumed that all types of erosion have a common cause. In the second phase of the paper, Dr. Ferrier has made special reference to Dr. Miller's experiments. In fact, he states that clinical evidence bears out the conclusions reached by Dr. Miller that the large percentage of erosions, so-called, are a self-inflicted disease—"a misguided effort on the part of the patient to keep the mouth clean." Dr. Black visited Dr. Miller, in Berlin, for several weeks during 1906 and had free access to the latter's laboratory during the time he was performing his experiments with toothbrushes, etc. While Dr. Black admitted that Dr. Miller was able to

produce, artificially, outside of the mouth; a condition which resembled erosion, he was not at all convinced that the sharp, clean-cut margins so often present in genuine erosion could be reproduced. Dr. Miller admitted that the action in the mouth of any acid which is capable of attacking the enamel, will cause erosion. He pointed out that acids must be suspected, especially when the wasting occurs rapidly. This evidence was amply substantiated by such investigators as Drs. Kirk, Truman, Talbot, Michaels and Badanes. The theory that erosion is more evident on the left side with those who brush their teeth with the right hand and vice versa with those who use the left hand has long since been proved incorrect, to my satisfaction, by close observation of many cases. Dr. Badanes has furnished a much more plausible theory of this phenomenon. He believes that, during sleep, the scant saliva secreted contains calcium salts to neutralize the oxalates, and this saliva accumulates in the side of the jaw which rests against the pillow. In this manner, the fresh saliva protects the teeth which are covered to some extent, while those which are not protected are subjected to the erosion caused by the soluble oxalates which are being exuded through the mucous glands. These oxalates, Dr. Badanes has proved, will cause erosion as they flow over the labial and buccal surfaces of the teeth, under pressure from the lips and cheeks. Dr. Stein *et al.* have shown that there are vastly different percentages of acids in different zones of the mouth, and it seems more than a coincidence that the zones which have the highest percentage of acids are also the ones which have the greatest amount of erosion. I have made many tests of saliva from patients who were suffering from rapid erosion. In some cases in which the p_H of the saliva was normal, when phenol red was applied directly to the eroded area an acid reaction was noted. This would indicate that one cannot be sure by simply testing the saliva and finding it normal, that some acids are not present in the eroded areas. My observations in patients who have ill-kept mouths do not agree with those of Dr. Ferrier. I have seen hundreds of bad cases of erosion of the types which he has discussed in the mouths of Indians and natives in Northern parts of Canada who have never used either toothbrush or other abrasives in the mouth. This evidence, I believe, is well supported by the observations made by G. V. Black among the many patients who presented themselves for treatment at the clinics in Chicago, and also by the observations of Louis

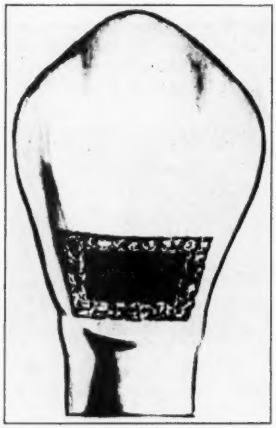

Fig. 17.—Gold foil operation. The darker area represents cohesive gold foil malleted into the remaining part of cavity, wedging the noncohesive foil toward the peripheral walls.

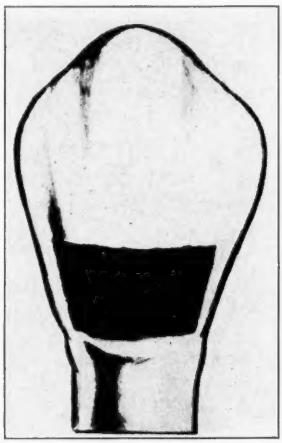

Fig. 18.—Cavity completely filled, cohesive gold having pinched off noncohesive gold at margin, leaving surface entirely covered with cohesive gold.

Ottofy in China and Japan. The third phase of the paper deals with brushing of the teeth and the restored surfaces. I admit that the improper use of brushes may cause irreparable damage to the investing tissues, but to say that brushes and dentifrices as used, even by the most fastidious, will cause the rapid destruction of tooth substance seen in many instances would be to blame those valuable toilet articles more than they deserve. Dr. D. P. Mowry of Montreal has constructed two brushes, one for the lingual surfaces and one for the labial, and buccal surfaces, so designed that patients with even average intelligence have no difficulty in cleaning the teeth without causing any injury to either tooth substance or investing tissues. The use of

Fig. 19.—Completed operation. The free gingiva covers the gingival margin and the mesial and distal gingival angles, giving the same appearance as the cavity preparation shown in Figure 11.

the toothbrush is correct in proportion as it imitates the natural excursion of normal foods over the teeth. This is in a direction incisogingivally and occlusogingivally and should provide a bumping against the gingival crest. One has but to have a mental picture of biting into an apple to get the idea; hence, the logic of having the handle of the brush at right angles to the head, to assist in this imitation of nature which civilization neglects. Dr. Ferrier's technic for gold foil restorations is to be highly commended. From the photographs, the cavity outline appears to be too angular for esthetics. Also, at the mesial and distal cervical angles, some difficulty will be encountered by operators who are less skilled than Dr. Ferrier in producing and filling such angles under the normal gum line as suggested, without causing great damage to the investing tissues. Dr. Black has shown that, in typical cases of erosion, where the wasting was active, the mere filling of the cavity with foil or any other material did not arrest tooth destruction and, in a short time, that portion of the tooth adjoining the filling would be affected; and if the filling were then enlarged, the process would repeat itself. I am of the opinion that the flow of the fluids in the mouth, combined with the action of the lips and cheeks, causes erosion. Therefore, when an eroded area is filled with foil, or gold or porcelain inlays, if the fillings are made slightly concave on the surface, the concavity following the outline of the deepest portion of the erosion or the cavity, the fluids will flow in the original direction and not be conducted over other parts of the tooth. Cases which have been treated in this manner have been under observation for some time, with no apparent change in the surrounding tooth substance. I report one case in which it would appear that the condition of the teeth was directly traceable to an abnormal condition of the general health: A young man showed rapid erosion of both upper and lower teeth, with great sensitivity. The case was admitted to a hospital for study. The findings were as follows: The urine was normal; the blood count showed a slight anemia. A gastric analysis failed to show the presence of free hydrochloric acid. The p_H of the blood was 7.46; the p_H of the saliva, 5.5. The acid saliva and the absence of free hydrochloric acid in the stomach appeared to indicate that the acidity of the saliva had a relationship to the lack of acid in the stomach. When the acid-secreting glands of the stomach were stimulated by the administration of 0.5 mg. of histamine hypodermically, a good flow of acid was obtained. The patient is at present taking 4 mg. doses of histamine preceding each meal, in an attempt to stimulate a normal flow of acid in the stomach. A diet was prescribed in which alkaline predominates. If any change is noted in the patient's oral condition, similar tests will be made with others suffering from rapid erosion. It is hoped that some means will be found to arrest

the progress of this type of tooth destruction.

James A. Loughry, Cleveland, Ohio: The securing of data through study clubs and collective clinical findings seems to be the sane way to approach the treatment of this condition, since, for every individual idea which has been advanced, there has been a logical refutation. The biologic factors that enter into other grave questions in dentistry surely enter into the problem of erosion. The agents which affect the soft enamel organs and subsequent layers in the earliest history of the teeth and have a bearing on the tendency to caries may predispose them likewise to erosion. The similarity of types, with different predisposing and subsequent causes, makes adherence to any set rule difficult. In a great many cases, the brushing technic and ingredients of preparations contribute to the rapid progression of this disease, but extreme cases are observed in which the factors are negligible. Although, as Dr. Ferrier states, little caries is present, a case is cited in which extensive caries in the posterior teeth was followed by a severe case of erosion in the anterior teeth. This, no doubt, was due to changes at different periods of life, as well as other conditions which will be mentioned. The constituents, organic and inorganic, of the entire structure of the individual tooth are affected at different periods of formation. After their eruption, further changes are effected by, first, the physical and mental habits of the patient, which increase or inhibit glandular function; secondly, the character of diet and, thirdly, malrelation of the teeth. It is difficult to differentiate between erosion, attrition and abrasion, especially if teeth have not been lost and there is an absence of any outstanding cause for the condition such as pipe smoking, tobacco chewing and the wearing of clasps, porcelain substitutes and partial dentures. Attrition and abrasion are often present without marked erosion, but where there is marked erosion, attrition and abrasion are invariably found. Teeth with defective sulci, their resistance lowered by invasion of bacteria, will become involved with caries on interproximal surfaces much sooner than those perfectly formed. Where there is evidence of attrition and abrasion, the internal change in the structure of the teeth to combat this wear makes them more susceptible to external influences, of which the chemicomechanical, which Dr. Ferrier has stressed, no doubt ranks first. Uneven or abnormal stress explains why one or several teeth may be affected and those adjacent in the same mouth be untouched. The case to which I previously referred explains my reasoning along this line and my observations lead me to think that, in the future, more of this type will be noted, for the tendency toward this class of malocclusion seems to be increasing. This is the excessive overbite where the cusps of molars and bicuspids seem more than normally developed and the sulci very deep with imperfect formation. In this case, the upper incisors were abraded on the lingual surfaces and the lower incisors were worn flat so that the outline of the pulp chamber was visible. The deep erosion grooves, involving the gingival labial third of these teeth and approximating the pulp, were present. The lower cuspids were quite prominent and would naturally protect the incisors from any brushing technic in vogue. The cuspids were not eroded, but a slight tendency was noticeable on upper left bicuspids. Incidentally, the patient held the brush in his left hand. The movements in mastication were limited. The open and shut movements crushed and forced food into the sulci without any lateral excursion and increased the tendency to decay, while the forced protrusive movement of the mandible caused wear on the eight anterior teeth and erosion was pronounced on the labial surface of the lower incisors. This was interesting to me as the majority of extensive erosion cases that I have observed have approached the end-to-end bite. Because there is little discomfort, attention is not called to erosion until the patient is along in years, great damage has been done and extensive restoration is necessary. I regret that Dr. Ferrier did not give more time to this phase of the problem, for the pathologic involvement, mandibular and muscle changes and habits formed, as well as future responsibility, places great importance on the diagnosis and prognosis of these cases. He has confined his paper mostly to erosion at the gingival area and I certainly agree with his suggestion as to proper restoration. Except where porcelain should be used for esthetics, there is no place where a gold foil filling is more certainly indicated or serves so well as in this class of cavities. The time saving item should not be overlooked. Emphasis should be made on Dr. Ferrier's statements regarding silicate cements and porcelain. Porcelain certainly has taken abuse unjustly at the expense of silicates and the erroneous impression left by calling sili-

cates porcelain should be corrected. As attention has been called to unequal distribution of forces as a probable cause of erosion and one calling for observation, may I digress and suggest early recognition of habits of mastication, especially after eruption of the third molars, which often changes the excursion of the mandible. Judicious grinding of interfering cusps and elongated teeth to allow freedom of mastication on all teeth may be quite beneficial and incidentally prevent splitting. In some cases, the extreme sensitiveness about the necks of one or more teeth which may be an early sign of erosion can be corrected by finding and eliminating some obscure condition.

ORAL PROPHYLAXIS IN ITS RELATION TO PERIODONTAL HEALTH*

By ARTHUR H. MERRITT, D.D.S., F.A.C.D., F.A.A.P., New York City

ORAL prophylaxis in its wider connotation may be defined as any measure that has for its purpose the prevention of oral disease. This being true, the efforts made by the research worker to unravel the hidden causes of dental caries or periodontoclasia are just as much a part of oral prophylaxis as are the clinical procedures of the dentist. Both have their part in the prevention of oral disease; one, in blazing the trail and making straight the way; the other, by applying to daily practice the lessons taught by the research worker. One is as important as the other.

Of all the measures employed in the prevention of mouth disease, none has thus far been more successful than that which aims at the establishment and maintenance of a high standard of oral hygiene. This is true notwithstanding the fact that, in many instances, dental caries and periodontal disease probably have as their primary cause some metabolic disturbance and that, logically, is the point at which the first efforts at prevention should be made. Unfortunately, knowledge in this field has not at present progressed to the point where it can be relied on in daily practice. As time goes on, it is not too much to hope that the day will come when preventive and remedial measures may be applied at the source of disease. Meanwhile, and until such time as the research workers in this and allied fields can point out to the clinician the practical application of their investigations, and how through such application he can more successfully meet the demands made on him in daily practice, he must continue to apply to the control of local conditions methods which, though not perfect, experience has shown are capable of yielding a large measure of success.

Much has been said and written about the value of oral prophylaxis in the prevention and control of dental caries; and there can be no doubt that it has an important place in this field; but it also plays a highly important part in the prevention and treatment of periodontal disease, because of the large part which bacteria play in the etiology and progress of all periodontal disease. Anything which contributes to the multiplication of

*Read before the Section on Periodontia at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 15, 1932.

bacteria in the mouth, as, for example, oral sepsis, is a potent factor in predisposing the periodontal tissues to disease. Conversely, anything which promotes cleanliness of the mouth is a valuable aid in the prevention and treatment of such disease. In the light of present knowledge, it is probably not an exaggeration to say that keeping the mouth physiologically clean would do more than any other measure to prevent the development of gingivitis, Vincent's infection and periodontoclasia.

If this is true, it is highly important to consider how this can be accomplished; for, in these days, when so much is being said about the high cost of dental service, it behooves the dentist to seriously consider how the cost of such service can be reduced to the advantage of all concerned. And the most logical way in which to do this is through prevention and early treatment, both of which will materially lessen costs.

To establish and maintain a hygienic condition of the mouth requires the cooperation of the dentist and the patient. Neither can succeed without the aid of the other; a fact that should be made clear to each patient. The dentist's part is to establish health in the mouth; the patient's, to maintain it, with the dentist's cooperation.

In the first instance, the mouth should be carefully examined and roentgenographed, especial attention being given the matter of hygiene. With all the data at hand, the first step in the care of the mouth is a thorough prophylactic treatment. This must be given in a systematic fashion if it is to accomplish its purpose. In a mouth with a full complement of teeth, there are 128 tooth surfaces to be considered, exclusive of occlusal surfaces. Unless prophylactic care is given in an orderly way, some of these surfaces are bound to be overlooked. Several instruments of different designs will be required to reach each of these 128 surfaces.

In a system which will be found to be satisfactory, we begin at the distolingual angle of the lower right third molar, passing the instrument into the gingival crevice and curetting as much of the distal and lingual surface as can be reached, proceeding in this way until the surfaces of all the teeth on that side to the median line are curetted. The instrument is then laid aside and another instrument adapted to one's need is brought to bear from the buccal aspect, curetting that part of the distal surfaces not reached with the previous instrument and also the buccal surface.

The mesial surface is next curetted, access to it being gained from both the buccal and the lingual sides. Exactly the same procedure is employed with each of the other teeth, finishing those which remain on the left side of the mandible and then, beginning on the upper right side, continuing in the same manner until all the teeth in the mouth have been curetted. This is done to remove any subgingival calculus that may be present and which may not be visible and also the detritus that is usually present. Instruments Nos. 17 and 18 of the McCall set and 3 and 4 of the Younger group meet all requirements, though any instrument to which one is accustomed and which can be brought to bear in the gingival crevices of all surfaces may be used.

Next, the teeth should be polished. About a teaspoonful of the polishing agent is placed in a small receptacle. Triple X silex is preferable to pumice stone. It is moistened to a thick paste with some alcoholic mouth wash to prevent spattering. This will also make

it taste pleasanter. A small quantity of any satisfactory disclosing solution is placed in a dappen glass.

With an inverted cone-shaped brush in the handpiece, the teeth and gums are painted liberally with the iodine solution and the brush brought to bear on the buccolabial surfaces, beginning on the lower right side and proceeding around each jaw from right to left, always brushing from the gums toward the occlusal surfaces. The buccolabial surfaces being completed, the brush is next brought to bear as far as is possible on the lingual surfaces, again working toward the occlusal line.

Next, a wheel-shaped brush is applied to the lingual surfaces and such of the buccal and occlusal surfaces as were not reached by the inverted cone are carefully brushed. These brushes come in two sizes and are easily adapted to all teeth. The grosser stains having been removed in this way, the teeth and gums are again bathed with the iodine solution and the teeth carefully gone over with porte polishers. Waxed silk tape is next passed between each tooth and the proximal surfaces are polished.

In this way, the surfaces of each tooth from the floor of the gingival crevice to the occlusal surface will have received the necessary treatment, curetting, polishing and taping. If this is properly done, each crevicular space throughout its circumference will have been emptied of its septic and calcareous contents, each tooth surface cleaned of its accumulated mass of stains, plaques, bacteria, etc., and the gums stimulated. The dentist's part does not end here. It becomes his duty, if he is to get the maximum of results from his efforts in oral prophylaxis, to see to it that the patient is properly instructed in his part of the preventive program; for, unless this is done, the patient will probably fail in maintaining the condition attained through treatment.

Having instructed him in the principles of oral hygiene, the dentist next teaches him the technic of intelligent home care. By demonstration in his own mouth, the patient is shown how teeth can be brushed and the gums massaged without injury to either. These measures should be carried out four times a day, before breakfast and after each meal, though the midday brushing can be omitted and probably will be by most patients. The use of silk after meals is desirable, for in no other way can the proximal surfaces of the teeth and the interdental spaces be properly cleaned.

Dentifrices should also be used for their cleansing and polishing effect. In order that the patient may use one of known composition, the dentifrice should be prescribed, as should properly shaped toothbrushes. Neither should be left to the choice of the patient. See that your druggist carries a stock of the brushes that you wish to prescribe and have him put up and keep on hand the dentifrices that you recommend. They can then be prescribed as dentifrice A, B, or C; which will save the time of writing out each prescription and make it possible for the patient to obtain the product without waiting to have it compounded.

Having completed the treatment, including instructions in personal care, the dentist informs the patient that he should return at a specified time and that he will be notified when that time arrives if he so desires. I make it a rule to notify only such patients as express a wish to have me do so after informing them of my willingness to do this. I do not then send an appointment card, simply reminding them by a printed form of their wish to be so notified, which frees them from any embarrassment if for any reason they do not care to return. In this way, the patient is advised regarding what

should be done in his own interests, but he is left free, as he should be, to do what he wishes in the matter. It is the dentist's duty to advise but not coerce his patients.

When these rules are observed, and they are so simple that they can be employed by any dentist, results are highly satisfactory. In those cases in which disease has not manifested itself in the periodontal tissues, it is entirely possible in many instances to prevent its development, provided, of course, one has the cooperation of the patient. When oral prophylaxis is employed as a postoperative measure in cases of periodontoclasia, it is the best means at our command against a relapse. These things being true, it may be said without exaggeration that there is no service that can be rendered patients that will do so much toward the prevention of all periodontal diseases as will oral prophylaxis.

580 Fifth Avenue.

ANESTHESIA AND EXTRACTION*

By FRED WERTHEIMER, D.D.S., Detroit, Mich.

ANESTHESIA for the routine extraction of children's teeth may be divided into two main divisions, local and general. The most widely used forms of local anesthesia are infiltration and conductive. The two agents most often used for general anesthesia are nitrous oxide-oxygen and ethyl chloride.

It is not my purpose to discuss the advantages or disadvantages of the various forms of local and general anesthesia, as to whether one is superior to the other. Most methods in use have merit, and an operator who has become highly proficient in using infiltration and conduction anesthesia would be unwise to change to general anesthesia with nitrous oxide-oxygen or ethyl chloride because some one else has a high degree of success with these agents.

For the extraction of children's teeth, regardless of the means used to produce anesthesia, the mental preparation and control of the patient are important factors in the success or failure of the operation. Therefore, I shall present a few suggestions, application of which has been of assistance to us, in the hope that they may be of some help to others; rather than to discuss the technic of any form of anesthesia.

Probably the question which is asked us most frequently is: Do you allow the parent in the operating room during the operation? If the work is to be performed under local anesthesia, the parents are admitted if they desire, although we do not encourage this, as most trouble is due to their presence. If any difficulty is experienced, they are asked to retire. If a general anesthetic is used, they are excluded entirely. The only exception to this rule arises when the child is too young to be reasoned with or is mentally abnormal. In these cases, it may sometimes be advisable while induction is taking place, and also recovery, to

*Read before the Section on Mouth Hygiene and Preventive Dentistry at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 14, 1932.

have some one around whom the child recognizes.

When the child comes in for extraction, we endeavor to impress the following points on him: (1) that we are human beings, with interests similar to his; (2) that an operation so trivial merits little discussion, and (3) that most of his teeth are good, but we will remove the ones that are bad before they ruin the good ones.

Our procedure is somewhat as follows: The patient is greeted by the assistant, who calls him by his first name and endeavors to engage him in conversation, foreign to dentistry, while conducting him to the operating room and seating him in the chair. At this point, the operator gradually takes over the conversation. If there is no assistant, the operator can manage very nicely by himself. The idea is to convey to the child the fact that we are vitally interested in the things that he is and that the operation which he is to undergo is of secondary importance. In fact, it is so trivial that it is not worth much discussion.

With the remark "Let's look at that tooth which has been bothering you," or a similar one, the operator starts to examine the mouth. Here, instead of telling the patient how bad his teeth are, we try to impress on him that his mouth is in pretty good condition, that most of his teeth are good, and what a fine thing it is that we are going to get rid of a few bad ones before they have time to ruin the good ones. For illustration, the mouth may be compared to an apple barrel; the bad teeth are rotten apples which we are going to pick out before they make the good ones rotten.

Other comparisons of this nature will readily suggest themselves.

LOCAL ANESTHESIA

Infiltration.—If the anesthetic is to be a local, the solution should be inserted very slowly, with practically no pressure. The various steps are explained, but other conversation is interjected. We endeavor to convey the idea that we are going to put a few drops of medicine around the bad teeth so that they won't bother him when they come out. Emphasis is placed on the fact that the medicine is to be put in very slowly, "just a drop at a time." Conversation is changed to something of interest to the child while the needle enters the tissues. Immediately the insertion is made, we make some such remark as, "There we are, right in the exact spot and there goes the first drop of medicine." This is done to indicate that everything is progressing as it should.

If the infiltration is done very slowly, and it will have to be done slowly if practically no pressure is used, extraction, in most cases, can take place almost immediately. Unless the operator is sure of his technic, it may be better to wait a few minutes.

Extensive abscessed areas around roots of teeth to be extracted can sometimes be anesthetized satisfactorily by injecting into healthy tissue around the diseased area. In these cases, it is usually necessary to wait three or four minutes before starting the operation.

Conductive Anesthesia.—The only conductive injection which we recommend is the mandibular, and this will usually permit extraction in from five to ten minutes, if properly made. This injection is very satisfactory, provided one does not consider the occasional chewing and biting of the cheek, tongue and lips a serious disadvantage.

In a young child's jaw, the ascending ramus and the body of the mandible

form quite an obtuse angle and the distance from the anterior border of the internal oblique line to the pterygomandibular space is shorter than in the adult. Therefore, the needle should be inserted almost on a level with the occlusal plane or masticating surfaces of the molar teeth. The depth of insertion is hardly ever over three quarters of an inch, and often it is less.

The symptoms of approaching anesthesia are explained and, before dismissal, the patient is warned not to eat anything until the numbness is all gone. In spite of this warning, certain children will chew cheek, tongue or lips, but all tissues seem to heal without any damage being done.

GENERAL ANESTHESIA

If a general anesthetic is to be used, nitrous oxide-oxygen is, in our opinion, the peer of them all, although ethyl chloride is used extensively in some places. The latter may be used as either a local or a general anesthetic. If used as a local, it should be sprayed on the area of operation, the mouth first being packed to prevent its inhalation. Do not count on the relief of much pain by the use of this method. Its chief advantage is that it sometimes enables us to collect two or three dollars for the extraction of a few loose teeth more readily than if we had simply picked them out.

In spite of the fact that ethyl chloride, when used as a general anesthetic, is considered a cardiac depressant and certain authorities say it is dangerous, children seem to tolerate it exceedingly well. Its safety seems to lie in the rapidity with which relatively small amounts will produce unconsciousness. Its repeated administration makes it dangerous; which makes it undesirable for any operation requiring more than a very short time. It is advised that nitrous oxide-oxygen be used in preference to ethyl chloride. We do not mean by this that any one who is using the latter agent successfully should discontinue it.

Nitrous Oxide-Oxygen.—If this agent is used, a soft rubber mouth prop is inserted and the nasal inhaler applied, with a brief but complete explanation. In regard to the mouth prop, it is usually slipped into place with some such remarks as: "This feels like a big wad of chewing gum and we are putting it there to keep you from chewing my fingers." The patient is then told that he is going to be allowed to smell something like perfume, through the inhaler, which will cause the teeth to go to sleep so he won't know when they come out. As soon as the inhaler is in place, we talk about things of interest to the child until he loses consciousness.

We are frequently asked about the postoperative care that is given these patients. About the only thing that is done is to arrange the gauze mouth pack so that it will cover the sockets of the extracted teeth. As soon as consciousness returns, the child is told to keep the mouth closed. This controls bleeding and assists in the formation of a normal blood clot. When the case is dismissed, instructions are given not to use any mouth wash until after the next meal. Postoperative trouble in cases handled in this way is conspicuous by its absence.

Each child is a separate problem, as all children do not react alike. For this reason, no set rules or forms of conversation can be given. A little study and a few questions will usually open the way to arousing his interest in something besides the operation at hand. School activities, athletics, vacations, games, playmates, animals, etc., are standard topics.

Regardless of how clever we think we are, we will sometimes meet a child who

absolutely refuses to cooperate in any way. In these cases, little time should be wasted in coaxing or cajoling. The work should be done under a general anesthetic, when, if the patient becomes obstreperous, he can be firmly held and given to understand that the work is going to be done regardless of his actions, but that it will be much easier for him if he will help instead of trying to hinder. This treatment usually assures a good patient for the future.

CONCLUSION

The operator who is prepared to administer either a local or a general anesthetic, and who uses a little judgment in the selection of his cases, will be able to eliminate some of the difficulties connected with extraction work for children. Local anesthesia will permit us to perform almost any operation in the mouth without causing physical pain, but it has absolutely no effect on psychic fear or mental pain. Many children expend a great deal of nervous energy during extraction under local anesthesia and most dentists have had the experience of not being able to finish an operation, not because of any pain, but owing entirely to the exhaustion of the nervous system. General anesthesia is the only means that we have of coping with these conditions.

A STUDY OF IMPRESSION AND MODEL MATERIALS FOR FACIAL CASTS

By ERIC H. GOLDEN, D.D.S., M.S.D., St. Louis, Mo.

RECORDS in the form of casts exactly duplicating the original object in form, size, coloring, etc., are needed in many of the sciences and arts. Especially in medicosurgical work, records of this sort are more and more in demand. Those of the face, head and mouth are particularly necessary, although casts of various parts of the body are frequently desirable. The need for these arises in surgery, medicine and dentistry.

In plastic surgery and in oral surgery, when facial contour is changed, the facial cast is an important record and a great help to the operator,[1] as illustrated in Figures 1 and 2. In the various medical sciences other than surgery and dentistry, it is impossible to furnish a comprehensive list of the fields where casts can be used, as new possibilities for their application are continually presenting themselves.

In dentistry, case records are essential, and especially so when alteration of any part of the face is involved. Facial casts show various facial developments better than do photographs, and are especially desirable in unequal development of the face, as they offer the advantages of a three-dimensional record. This phase of their use, as stated elsewhere, is of importance mainly to orthodontists,[2] as illustrated in Figures 3 and 4.

1. Davis, J. S.: Plastic Surgery, Its Principles and Practice, Philadelphia: P. Blakiston's Son & Co., 1919, p. 34.

2. Golden, E. H.: Wax Spray Method for Facial Casts, J.A.D.A. 18:739 (June) 1926.

In the severe types of malocclusion, facial casts serve to demonstrate more vividly the facial changes effected by treatment. The facial cast with the dental insert, as described by Margolis[3] and by Oliver[4] has its use in conjunction with Simon's gnathostatic casts[5] and photostatic roentgenograms giving a photostatic profile record as advocated in Bolton's study of the development of the face at the anatomic laboratory of Western Reserve University and set forth in a paper by Broadbent.[6]

This method of recording facial changes by casts can be applied in all methods of diagnosis in orthodontia advocated at this time, and others that will follow. To make successful reproductions of this sort, it is necessary to have suitable materials for both impressions and casts.

The properties of an impression or cast material must be judged in large measure by its adaptability to a certain technic. Therefore, an investigation into the merits of these materials must of necessity become also an investigation of various ways of manipulating such materials as are proposed for the purpose.

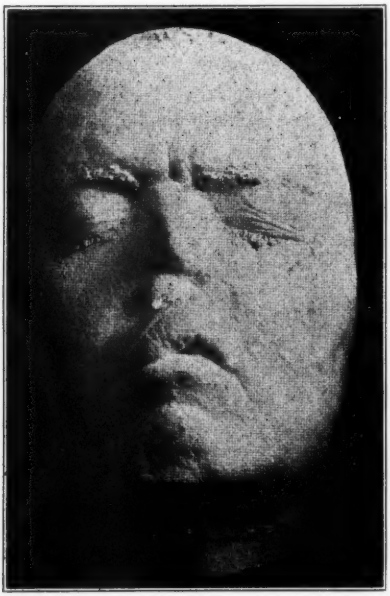

Fig. 1.—Cast taken before plastic operation. Detail of scar and area around nose may be noted.

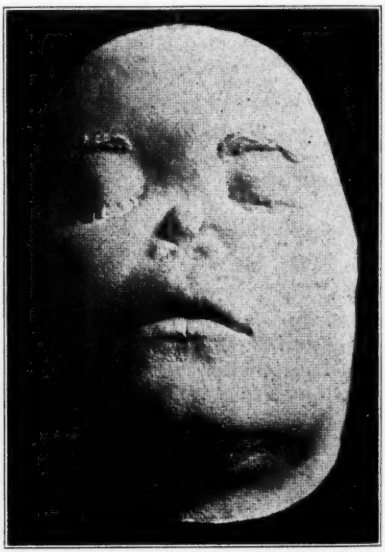

Fig. 2.—Cast taken before plastic operation. Detail of area around nose may be noted.

3. Margolis, H. I.: Improved Method of Obtaining Dental Insert in Facial Cast, Internat. J. Orthodontia, 11:308 (April) 1925.

4. Dewey, Martin: Practical Orthodontia, Ed. 4, St. Louis: C. V. Mosby Co., Vol. I, 1919, p. 352.

5. McCoy, J. D.: Applied Orthodontia, Ed. 3, Philadelphia: Lea & Febiger, Vol. I, 1931, pp. 136-140.

6. Broadbent, B. H.: Radiographic Study of Development of Face and Jaws, unpublished data.

In the present study, an attempt is made to relate the properties of the materials to some standard and original methods of making facial casts, with a view to determining what materials and what ways of employing them are most satisfactory.

TECHNIC

It will be necessary to set forth the methods of manipulating the materials before studying the properties of the materials themselves. The technic of impression taking will first be described and then that for making casts. The

Fig. 3.—Case of very nervous child. The cast was taken in record time and the patient experienced no discomfort. The cast has a glossy finish.

impression technics experimented with were of two kinds: (1) for wax, and (2) for hydrocolloidal compounds.

The wax materials may be applied by two methods: (1) spraying, and (2) brushing.

1. *Impressions with Wax Mixtures for Spraying.*—For spraying, a mixture, later designated as B-11 wax mixture, is used by means of the DeVilbiss type CB spray gun with low pressure, as illustrated in Figures 5 and 6. A pressure of only from 4 to 6 pounds is employed, for if the pressure of air is raised, the wax does not deposit evenly and will cause a mist.

The first layer, which is to give detail and insulate, is sprayed over the face evenly with the eyes closed, preferably, and no tubes used in the nose, as illustrated in Figures 7 and 8. The second layer, deposited to the desired thickness (about one-half inch) may be applied with a spatula and with the wax

Fig. 4.—Full facial cast showing detail of features. The cast has a glossy finish.

in a congealing stage, as illustrated in Figure 9.

If dry ice (solid carbon dioxide) in sacks is applied, the wax will harden very readily and can be removed quickly. About 1 inch of wax should be applied. The usual time required for the cold to penetrate is from six to eight minutes. If this is not desired, a greater thickness of wax must be applied to give rigidity, or a thin coating of plaster con-

taining accelerator for fast hardening can be used.

This method, which I developed, is suitable for full facial casts, or any partial work.

2. *Impressions with Wax Mixtures for Brush Application.*—A low melting point wax mixture (bayberry wax, 50 per cent; paraffin, 25 per cent; stearic acid, 25 per cent) is brushed on the face with a camel's hair brush, a thin layer being placed on first. After this, the wax in a congealing stage can be applied rapidly with a spatula to the desired thickness. It can then be reenforced as described above for spraying, or dry ice packs can be used for chilling rapidly, thus giving rigidity.

Fig. 5.—DeVilbiss spray gun type BC, designed for use with small air compressing outfits having no pressure control. It may be used with pressure feed only, either tank or cup. It has a bleeder air valve which prevents the building up of pressure in air hose when the spray gun is not being used. It is also equipped with an air adjusting valve for the regulation of atomizing pressure at the nozzle.

Brush application is advised as most suitable for partial impressions.

3. *Impressions with Hydrocolloidal Compounds ("Negocoll").*—Any hydrocolloidal compound is applied best by rubbing on the first coat with the fingers and then adding more thicknesses with a spatula.

On being allowed to cool or being chilled with dry ice, the impression is removed from the face. If it is to be poured in "hydrocol B" or artificial stones, it should be reenforced with a plaster shell, this work being done in the laboratory.

In the use of negocoll in taking impressions of highly sensitive areas, such as the eye, it is advisable to use a fine camel's hair brush and apply carefully.

This material is suitable for any sort of facial impressions, or for impressions of other parts of the body, as illustrated in Figure 10, and duplicate casts may be made from the impression.

To quote in part from Gruenebaum:

Negocoll can be made aseptic by boiling and can be used over and over again. A good plan is to keep your material in boxes marked by numbers and keep a record of the use of same. For example, material that has been used on any part of the face mark No. 1, that used on any other part of the body mark No. 2, diseases No. 3, death masks No. 4, and so on.

Fig. 6.—DeVilbiss spray gun type CB with pressure feed cup type KL. The type KL cup is easy to attach and convenient to handle with the type CB spray gun. Various colors and materials may be kept in extra cups with screw covers to facilitate change of color.

The method of using Negocoll is to heat the material in a double boiler until dissolved and then chill to body temperature. Begin to boil your material about one hour ahead of time (and keep it warm, as it takes one-half hour to dissolve a large

amount) so as to be all ready when the patient arrives.

After the material is chilled to body temperature, apply it with a brush and fingers to about one inch thickness, then thoroughly chill by use of a fan, compressed air, or hair dryer with only cold air applied. Before removing, it may be reinforced with plaster, wires or gauze saturated in Celerit. On account of its rubber-like consistency it may carefully be removed out of undercuts, which would be impossible in the use of plaster.

Three boxes of Negocoll are necessary to get an impression of the face and ears; four boxes for a profile; ten for the whole bust; one and one-half for a hand and one and one-fourth for an ear.

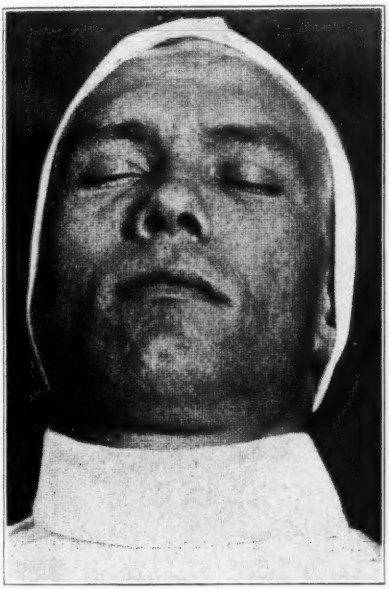

Fig. 7.—Position of patient and method of placing towels to spray wax for full facial impression.

It is always necessary to have a larger amount prepared than needed since Negocoll hardens on the walls of the container before you complete your work. It is also advisable to pour off a certain amount into a small basin or a thick china coffee cup which has been previously heated in boiling water; it will hold the desired temperature for quite a while. Also have boilable cups handy and paint brushes one to one and one-half inches in size.

Negocoll must be stirred while boiling in order to have an even temperature throughout the entire mass; however, do not stir too much as you will kill the material, the same as too much stirring kills plaster; if you let it cool somewhat it will be necessary to begin all over again.

In reproducing a profile, you can form the ear separately, also the nose. The nose piece should then be removed and two holes cut into same for an air passage, then replace. Next cover the balance of the face including the nose and ear pieces. Always begin to apply Negocoll from the neck up. The reason for this is that the stiffening of the Negocoll will support the cheek and muscles and carry the weight of the new Negocoll as applied, otherwise tissues would be distorted or the nose pushed to one side. For the same reason, the patient should sit up in a chair, as lying down, the lips would

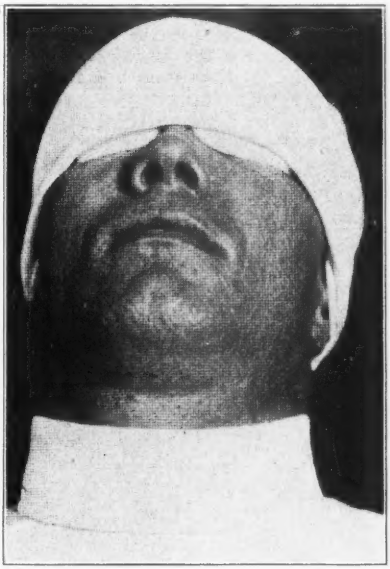

Fig. 8.—Position of patient and method of placing towels to spray wax for partial facial impression.

flatten against the teeth and eyes fall back in their sockets. The patient should also be in a receptive mood, with happy thoughts, not smiling or trying to go to sleep during the impression taking, as it changes the muscle tone and the cast will show a tired appearance.

In working with this material, you must keep the patient well covered, also in taking other parts, cover the exposed surfaces to keep from being soiled. An ear, for instance, can be taken by using a piece of cardboard, cutting a hole in it large enough for the ear to protrude and then apply Negocoll. You can also make a frame out of modeling clay or organdie dipped in Celerit to wall off the ear. A hand can be made in one piece or two halves and also any other part of the body. A death mask can of course be made in one piece. If necessary a string can be laid over the head from ear to ear with two ends protruding and by pulling on the two ends and straightening out the string, the mask can be cut in half.

The positive model can be poured in plaster or Hominit. In either case, the model will have to be retouched with instruments on account of small defects or air bubbles which are the result of faulty workmanship and not of the material.[7]

4. *Casts with Plaster Materials.*—The casting technics are of two sorts: (1) for plaster materials and (2) for hard wax materials.

Hydrocal "B" (orthopedic hydrocal) is mixed to the desired thickness (preferably 4 parts water to 10 parts hydrocal) and vibrated by using an alternating current electric vibrator which gives 3,600 pulsations per minute and can be controlled in intensity.

If thinner mixes are used, the advisable procedure is to allow the mixture to flow back and forth and in and out of the impression. When hydrocal is beginning to solidify, it can be vibrated to some extent.

Any imperfections, such as air bubbles, can be corrected by applying negative correcting paste, which contains the same substances as are in "negocoll," in a mineral base.

In large hollow casts in which fine detail must be reproduced, the first mix of 4 parts water to 10 parts hydrocal is made to cover all the surface and vibrated. Then, a second mix of 3 parts water to 10 parts hydrocal is allowed to run to the desired thickness and vibrated. This technic has the advantages of being quicker and producing details more easily. The thicker, second mix maintains the desired thickness of the cast more easily.

Fig. 9.—Various layers as deposited on tissues: *1,* insulating layer of wax; *2,* body layer of wax; *3,* rough layer of wax; *4,* rigid layer of plaster.

7. Gruenebaum, Morris: Making of Facial or Body Casts, Oral Hyg., 22:2216 (Dec.) 1932.

Hollow casts may be reenforced with wires or screening of monel metal; or sacking or gauze can be used. Hooks can be made for hanging casts by the use of bent monel metal wire embedded in the cast.

Hydrocal casts should be dried at a sufficiently low temperature to prevent calcination, which would result in loss in strength. While moisture is still present in the cast, the drying temperature may be safely carried as high as 65.6 C., but, at the end of the drying period, the temperature should not exceed 48.9 C. Casts must be thoroughly dried before lacquering or tinting.

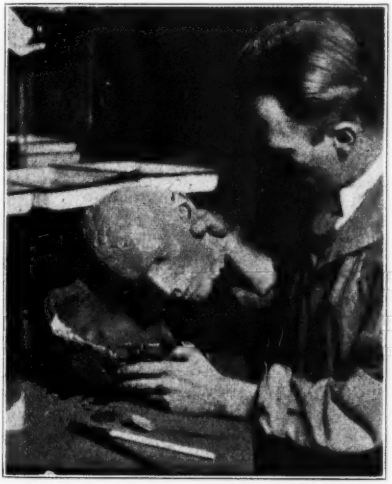

Fig. 10.—Appearance of facial cast immediately on removal from "negocoll" negative.

To waterproof casts for permanent record, and make them washable, a transparent lacquer is applied either by brush or a spray gun. The DeVilbiss type GNO 3083 spray gun is desirable for the reason that an even thickness of each application can be attained with no brush marks. The DeVilbiss spray gun type CB, which is used for spraying the wax, may also be used for this work.

From 1 to 1.5 per cent of either fusel oil or amyl acetate may be used in mixing hydrocal when a vibrator is used, and from 2.5 to 4 per cent when no mechanical vibration is used for removing air bubbles, this giving an exceedingly smooth cast for the reason that when the hydrocal is poured, the fusel oil or amyl acetate floods to the surface, carrying parts of the finer ground hydrocal, thereby affording a more clearly defined pore or epidermis detail.

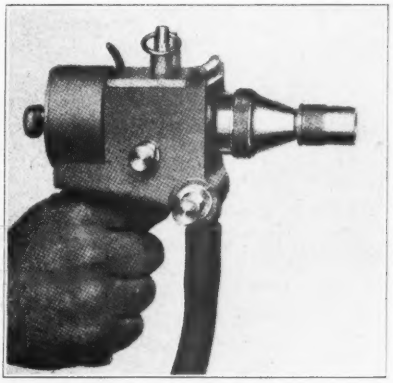

Fig. 11.—Metalayer which uses metal in wire form of standard commercial gages and with which coatings of copper, brass, bronze, German silver, aluminum, zinc, lead, tin, iron, nickel, monel metal, the precious metals and various alloys of same may be sprayed.

After a number of experiments with the various lacquers on the market, Egyptian lacquer, water white, flat, TK-243 and thinner K-243 have proved most satisfactory. It is best to apply two to three coats at twenty-minute intervals. If color is desired, any of the enamel lacquers may be used. White enamel lacquer Egyptian No. 415, flat,

thinner T-75 is very desirable; and, for base and background, Egyptian nite black enamel No. 31, thinner T-75 is the most adaptable.

Hydrocal casts may be coated with metals such as bronze, copper, brass, nickel, aluminum, monel metal, iron, tin, zinc, lead, gold or silver and the various alloys of the same by the Schoop process of metal spraying, which is accomplished by the "MetaLayeR," as illustrated in Figure 11.

The sprayer is connected to standard acetylene and oxygen cylinders and to a supply of compressed air, consuming, while in use, approximately 15 cubic feet each of the gases per hour and 50 cubic feet per minute at 50 pounds pressure of the air.

A single coating is about one thousandth inch thick. The operator's vision easily guides him in distinguishing between the coated and uncoated portions and also between a first and second coat.

From four to ten thousandths inch well impacted upon a surface is just as effective as a much greater thickness, and, of course, unnecessary spraying of the metal increases the cost of operation.

For building up dimensions or filling defects in surfaces, coatings of any desired thickness may be applied.

5. *Casts with Hard Wax Compounds.*—The hard wax compounds, such as "hominit," are applied by brushing or spraying onto the impression. They are more applicable to impressions of negocoll, but can be sprayed onto wax impressions with care, as developed by me, using the DeVilbiss spray gun type CB, which is used for spraying the wax, but a pressure of about 30 pounds is necessary.

After the first layer, gauze strips or sacking are embedded in the succeeding layers of hominit; and, to reenforce more strongly, "celerit" is used as a last layer.

The special light hominit is used only for the first layer where a light tint is desired. Both plaster and hard wax compound casts can be tinted in natural colors by the brush or the spraying technic, using oil pigments. Very natural reproductions are attained.

The advantage of hard wax compound casts, as far as color is concerned, is that the hominit can be tinted with various basic colors before application and they may then be modified as desired.

To give greater permanence and waterproof qualities, these casts should be sprayed with transparent lacquer when finished as described above for plaster technic.

PROPERTIES OF IMPRESSION MATERIALS

1. *Properties Necessary in Impression Materials.*—In the use of materials for facial impressions, there are several facts of importance to be considered The material, to be of practical use, must be adaptable to a technic that will not interfere with breathing and does not require that tubes, which distort the nose and irritate, be placed in the nostrils. Also, it should be applicable in taking impressions with the eyes open or closed.

The material should be of low enough temperature to be applied to the most sensitive skin surfaces with toleration, but not so low as to change form at ordinary room temperatures. It should have a congealing or setting time sufficient to allow completion of application, but it must harden with sufficient speed and have a degree of conductivity allowing acceleration by cold packs, thus facilitating removal without undue loss of time. It must have sufficient strength to resist manipulation in making the

cast and must be able to reproduce and retain fine detail during the process of making the cast.

As regards rigidity, in any case, the material should be sufficiently rigid to retain contour and fine detail while the cast is being made. In certain types of work, when the necessity of reproduction of extensive undercuts or duplication of casts is paramount, a certain amount of elasticity is more important than absolute rigidity. It is impossible that these two qualities be united in one material.

Convenience is to be considered from the standpoint of speed in application and ease of manipulation in both operating room and laboratory.

The formula which I decided on for spraying is designated as B-11 mixture,[8] melting point 52.97 C., consisting of 55 per cent paraffin, melting point 51.7 C.; 20 per cent bayberry, melting point 40.9 C.; 5 per cent carnauba, melting point 84.8 C., and 20 per cent stearic acid, melting point 69.9 C.

The mixture gave a melting point of 52.9 C., or an increase of only 1.2 degrees in temperature above the paraffin melting point, which, for the use to which it was to be put (i. e., spraying upon the tissues), was not appreciable, and the impressions obtained were ideal in accuracy of detail and maintenance.

In the brushing technic, certain properties of waxes, somewhat different from those for the spraying technic, are desirable. Especially, a lower melting point is essential in order to make the temperature tolerable when the wax is applied in quantities such as would be laid on by a brush.

From the facts concerning the various waxes investigated, conclusions were made applicable to waxes used in the brushing technic.

1. Carnauba wax was eliminated on account of the undesirable qualities of high melting temperature and contractibility.

2. Bayberry wax was made the base (50 per cent used) because of its greater hardness for the low melting temperature.

3. Paraffin (type B) was used for its strength and for the degree of melting point. In addition, it is nonadhesive, easily obtainable and moderate in cost.

4. Stearic acid was used for its control of the contracting properties of bayberry, its hardness, obtainability and moderate cost, and its ready transmission of heat in varying degrees.

The formula which I decided on was: bayberry wax, 50 per cent; paraffin, 25 per cent; stearic acid, 25 per cent.

Experiments regarding the melting point of the mixtures decided on were made by the Sayboldt test.

Tests were taken at one-minute intervals and the melting point was determined when three thirty-second interval tests were made showing the same temperature; in this case, 41.7 C. This would make the melting point 41.7-42.8 C., according to commercial custom.

As this combination continues plastic until possibly thirty degrees above its melting point, it is adaptable for use in brush application to take impressions, and advisable to use for partial facial impressions.

2. *Hydrocolloidal Compounds as Impression Materials; Composition of Hydrocolloidal Compounds.*—The plastic hydrocolloidal composition known as negocoll and also "dentocoll" is a reversible hydrocolloid mass, a solution of a reversible colloid, which can serve for a great

8. Golden, E. H.: Thesis submitted to Northwestern University for the degree of master of science in dentistry.

number of different purposes, such as enabling castings to be taken from the oral cavity for dental purposes or from other parts of the living body. The study of this material will be confined mainly to impressions for facial casts.

This material is characterized by the fact that it contains, in a hydrocolloid reversible mucilaginous base substance, caoutchouc, fatty substances and resins in a very fine distribution. The mass formed has the character of putty or dough.[8]

This is a plastic composition comprising the foregoing ingredients intimately mixed to plastic condition, rapidly hardening at temperatures of the human body and reversible to plastic condition again.

As to the accuracy of this modeling composition tests for the linear dimensional changes of negocoll and dentocoll impression material as would occur in actual use proved that the hydrocolloidal compounds for impression taking are more accurate than plaster, as there is no expansion and, on the other hand, the degree of contraction is less during the working period, i.e., up to fifty minutes, than the expansion of plaster, and is negligible.

For the modulus of rupture and of elasticity, also demonstrating the load at elastic limit and stress at elastic limit of negocoll (identical with dentocoll), the transverse test was made.

This test brought out the following facts of importance in the use of this material:

1. That there was no change in the resistance of the material to stresses during the tests such as might be caused by drying out.

2. That this material had a greater elastic limit, or proportional limit, than would ordinarily be expected for this general type of materials, considering the number of parts of elastic material in comparison to the nonelastic materials in the compound. Out of one thousand solid and semisolid constituents, only ninety are definitely elastic, and 540 of a mucilaginous character possessing possibly slight elasticity.

PROPERTIES OF MODEL MATERIALS

1. *Properties Necessary in Model Materials.*—For casts, the property of durability is to be considered from the standpoint of permanence of retaining the record, rigidity sufficient to allow duplicates to be made when necessary and resistance to disintegration when coloring matter is mixed with the material or is applied to the material later.

That the cast material have surface hardness and detail is essential for the permanent recording value of the cast. The possibility of different consistencies of the cast material is frequently an advantage in manipulation, when fineness of detail, on the one hand, or size of the cast, on the other, is concerned.

The cast material must have a reasonable setting time to allow the making of the cast while the material is at its best working consistency. It must have sufficient body strength to resist handling and assure a permanent record when made hollow. It should be possible to make casts both solid and hollow, but of sufficient strength and not undue thickness when made hollow.

The material should be of a sort to allow of a simplified laboratory technic, and not require too much skill on the part of the assistant, or too expensive and elaborate equipment.

2. *Plasters and Hard Waxes as Model Materials.*—Two materials have proved so far to be nearest ideal for casts. One is a high grade of plaster having the advantages of ordinary plaster as to convenience in setting time and greater

hardness than the artificial stones heretofore used. This plaster is known by the trade name of orthopedic plaster, or hydrocal "B."

The second is a hard wax compound, composed in part of synthetic rosin, carnauba wax and clay. This has been found adaptable for hollow casts when reenforced with various thicknesses of gauze. This hard wax compound is known by the trade name of "hominit."

(*a*) Properties of hydrocal: Of the various plasters, hydrocal, a comparatively new product, was decided on as most suitable for making casts in view of investigations,[8] as it exhibits properties hitherto unattainable by the use of gypsum cements. It is made by a special method, i.e., calcinating dry gypsum rock under steam pressure, giving larger crystal structure than possible with ordinary plaster. (The properties of this material have been investigated in the research laboratory of the U. S. Gypsum Company.[9])

This procedure results in a material less colloidal in nature and of lower consistency, 30-50. It has increased strength, from 7,800 to 10,000 pounds per square inch in crushing, as compared to Keen's cement, from 5,000 to 7,000 pounds per square inch; and ageing qualities are inhibited.

About 4 parts of mixing water to 10 parts of "hydrocal" are required to give a pourable mix. It can be molded with as low as 25 parts water.

The normal setting time is from twenty-five to fifty minutes, but setting can be accelerated to a few minutes or retarded to several hours.

The tensile strengths range from 600 to 1,000 pounds per square inch.

9. Dailey, M. C.: Technical Service Bulletin on Hydrocal, Research Laboratory, U.S. Gypsum Company, Chicago.

(*b*) Properties of hard wax compound: The hard wax compound on the market, under the name "hominit," offers the advantages of allowing the making of hollow casts of accurate detail with extreme thinness. As the material can be colored in the basic colors when melting for application, it is very adaptable for tinting.

According to analytic tests, the product consists of: carnauba wax, 73 per cent; rosin, 3 per cent; ash (composed of silica, lime and magnesia), 24 per cent.

From the tests, appearance and color, no doubt a medium grade of No. 1 North Country carnauba wax is used,[8] this giving the compound a brownish gray appearance due to impurities in this grade of wax. This color does not lend itself very readily for tinting, and its dark appearance, if not tinted, is deceptive in taking casts of the white race. The mixture could be benefited greatly by the use of No. 1 Flora pale yellow carnauba wax, which is the highest grade. By using this grade of wax, a very light appearance should be assured which would allow the use of the various tints to a finer degree, to give a natural lifelike skin coloring to the finished cast.

By the addition of a small percentage of paraffin wax, the higher temperature wax preferably, ranging from 5 to 15 per cent, a milky tinge is given to the compound; which is an advantage in making death masks. This cloudy appearance can also be taken advantage of in the making of casts of children and women.

SUMMARY

1. The wax mixture referred to as B-No. 11, applied by the spraying technic given above, and chilled by the dry-ice method, is the most satisfactory material for taking impressions of living objects, when the facilities are available.

2. The wax mixture for brushing referred to above, applied by brush and reenforced by a shell of plaster, is the most satisfactory material for taking impressions of small living objects, when facilities for spraying are not available.

3. The hydrocolloidal compound, referred to as "negocoll," applied by rubbing on a film and then depositing to the desired thickness by spatula, is the most satisfactory material for taking impressions of inanimate objects and for making impressions for death masks, especially when duplicate casts are required.

4. Orthopedic plaster, known as "hydrocal B," has, especially when the consistencies are properly controlled and the mass vibrated as indicated above, the advantages of plaster in manipulation and the advantages of artificial stones when set, for the making of large, hollow casts.

5. The hard wax compound, referred to above as "hominit," applied by brushing or by spraying, and reenforced by gauze or burlap, is most satisfactory for small, light, hollow casts, occupying little space for storage, and is susceptible of easy and lifelike tinting.

ORGANIZED DENTISTRY

By J. E. BUEHLER, D.D.S., Great Falls, Mont.

AT the last annual meeting of the Montana State Dental Association, the following motion was offered and passed:

> The secretary-treasurer is instructed to have printed an explanation of delinquence; how it affects life membership, group indemnity insurance, group life insurance, cost of putting on meetings, etc.; and that a copy of this explanation be sent to every ethical dentist in the state, and a copy be given to each applicant for membership in the state association, at the time the application is made.

In compliance with these instructions, and that the explanation might be as nearly complete as possible, letters were sent to the ten district societies, inviting questions and criticism.

In attempting to answer the questions already asked, and those to be anticipated, the subject broadens out into organized dentistry, what it has done for the profession, why every ethical dentist should belong and pay annual dues, and give of his best efforts for the support of the organization. It is not difficult to persuade a dentist to join our state association, but to hold him year in and year out is another matter.

Why is every state association confronted with this same problem? Perhaps the fact that the average dentist does not recognize and understand the benefits the organization affords the individual is largely responsible. A member who becomes delinquent in the payment of dues has not attended the meetings of either the American Dental Association or his own state society; he has not received THE JOURNAL, and with the loss of these immediately tangible benefits, the question arises in his mind: What do I get for the dues I am now asked to pay? The more remote benefits which are by far the most important in number and value are foreign to his understanding.

Jour. A. D. A., July, 1933

This lack of information is regrettable, and the earlier our organizations realize this, and take the proper steps to disseminate that information which the individual should have, the sooner will the organizations obtain the support to which they are entitled.

A brief reference to the early history of organized dentistry is not only interesting but also informative, as it will enable us to better understand the need for an organization. The profession of dentistry started as merely a trade, an empiric handicraft, upon which charlatanism and quackery could thrive. The first college of dentistry was established at Baltimore, Md., in 1840, by Drs. Hayden and Harris. In 1844, Horace Wells, a dentist, discovered the anesthetic properties of nitrous oxide gas; and, in 1846, William T. G. Morton, also a dentist, discovered the anesthetic properties of sulphuric ether. Soon thereafter, various dental societies were organized, and a number of states enacted laws regulating the practice of dentistry. From the impetus given it by Hayden, Harris, Wells, Morton and other dental pioneers, the dental profession, in a very brief period of time, made a most remarkable advancement.

It is also worthy of note that a corresponding development took place in the manufacture of dental instruments, equipment and materials. This special industry has progressed hand in hand with dentistry, and American dentistry and dental manufacturing industry are recognized as preeminent throughout the world. The simultaneous organization of dental societies and the enactment of dental laws are significant.

Let us now consider organized dentistry in its three component parts, the district society, the state association and the American Dental Association. We shall treat each component separately and endeavor to point out the benefits derived from each, emphasizing particularly those benefits which tend to answer that question, "What do you, as an individual, obtain for the money you pay as dues?"

The local or district society is the smallest unit of our organization. In the more thickly populated sections of the country, these organizations take on a function of no small importance, their activities increase and their accomplishments are not a few. Some of their meetings are larger and better attended than those of the state association, but, in the sparsely settled country, the district society has continued to function. In the recent survey on the cost of dental care, the responsibility of getting the reports fell on the officers and members of the district society. The applications for aid from the Relief Fund work down through our organization until they eventually reach the district society, and the final disposition of the application depends almost entirely on the recommendations of this society.

In matters of state legislation, either beneficial or detrimental, the local or district society can exert a controlling influence on local legislators. This influence on legislation may be better appreciated by a study of the activities of the Legislative Committee of the American Dental Association, which will be discussed later. Again, the district society may function in opposing an occupational tax. Under the stress of present economic conditions and depleted governmental funds, such a tax is more than a remote possibility. Such a tax already exists in some parts of the country. Though the district societies in our own state are small, and sometimes poorly organized, they have provided a medium for coordination between the individual and the state association.

Our state association furnishes benefits

to the individual dentist as well as to the profession as a whole. The annual meeting affords clinicians an opportunity to teach and demonstrate the newer ideas and developments in the science of dentistry, at a reduced cost to the individual. Exhibitors' displays furnish an opportunity to see the latest in equipment and instruments. Fortunate indeed is that state meeting which is large enough to attract numerous exhibitors, from which source a nice revenue for rental of space is obtained. Some of the individual benefits that the state association affords its members follow.

The minutes of the 1917 meeting of our state association disclose the fact that aid was given some of its members in obtaining commissions in the Dental Corps of the Army or Navy.

The constitution and by-laws of our state association provide that any member who has paid the annual dues for twenty-five consecutive years becomes a life member, and, as such, is continued as a member of the American Dental Association, and on the mailing list for THE JOURNAL, as long as he resides within the state. At the present time, we have nine life members, for whom the association pays annually $4 each for membership in the American Dental Association. All members are urged to continue payment of their annual dues until they are eligible for life membership.

The payment of annual dues also has to do with the administration of our relief fund. At the time provision was made for relief, the association deemed it advisable, in order to conserve funds, first to insist on at least five years membership in the organization as a basis for eligibility, a ruling in conformity with the regulations regarding the Relief Fund of the American Dental Association; secondly, to rule that the amount any one individual may obtain in any one year shall not exceed the total amount he shall have paid as annual dues during his entire membership. The original intent of these provisions was to safeguard the relief funds, but it also has the interpretation that the more annual dues paid by a member, the more he is entitled to receive from the relief fund, should the occasion arise. This should not be considered as a form of insurance.

The group liability policy which is carried by the state association was obtained in 1917. The minutes of our meeting will show that other policies, offered at a cheaper premium, have been rejected. At the present time, there are sixty-two of our members covered under this blanket policy. This same policy, if written for a dentist not a member of our association, would cost double the premium, and the agent of the Aetna Company states that he is instructed not to solicit this form of insurance from dentists who are not members of our association, regardless of the increased premium. Cooperation between the Aetna Company and our association has helped hold our members, as a cancellation of membership, also causes a cancellation of the liability insurance for that member; and, in like manner, this cooperation has influenced members who have been dropped for the nonpayment of dues to rejoin, as the protection at a reduced premium is attractive. In connection with group liability insurance, the following is quoted from the *Iowa Dental Bulletin:*

"In times like these protection is of relative greater importance because of the greater probability of malpractice suits being fabricated by disgruntled and unscrupulous patients. Insurance company reports show an increase of malpractice suits in Iowa during the past three years, of almost 100 per cent. The premium paid for adequate protection is not only a great saving in money in the event of a suit but is also a remedy for worry about such chances. Malpractice insurance should be one of the last expense items dropped.

In summarizing the actual cash benefits offered by the state association, we find that those who carry the group liability policy are saved $15 a year on the cost of the insurance.

Perhaps the most important function of a state dental association is in the matter of legislation. In our own state, the records show that the dental law was passed before the state dental association was organized; but these records also show that the same group of dentists who sponsored the dental law were the organizers of the state dental association. Until the year 1926, our state association had no legislative committee, with the exception of the year 1908, when there was one which sponsored the dental law we have at present, and which was enacted in 1909. Those who minimize the importance of dental organizations, which have sponsored practically all dental laws, may well pause to consider the chaotic conditions which would prevail without these laws. Having obtained a dental law is an accomplishment; but to maintain, support and enforce the law is another matter. From our own experience, we are only too familiar with the result of trying to enforce an unpopular and unsupported law. Efforts are being constantly made to enact legislation which would be detrimental to both the public and the profession, and there is always need for a fair and just protection. Thus, through the medium of our state association, we are able to bring influence on legislation not only within the bounds of our own state, but also nationally.

RECENT STATE LEGISLATION OF GENERAL INTEREST

The Kentucky dental law has been changed so that it is unlawful to practice under the name of a corporation, company or association. A dentist may sign a death certificate. Causes for revocation of a dental license have been increased to include fee splitting, and employing unlicensed persons. Revocation of a license is now a mandatory procedure on the board of examiners.

Colorado has revoked the license of Painless Parker. This case was carried through the courts and revocation sustained. Thereafter, five of the former employes of Parker were also taken into court. Of these five, three also lost their dental licenses. These cases were carried through the higher courts and are now before the Supreme Court of the United States.

California recently suspended the dental license of Painless Parker for a period of five years. Parker was found guilty of employing unlicensed men to operate one of his establishments. The Board of Examiners of California obtained the foregoing action in the superior court of the city and county of San Francisco, and judgment was rendered. Parker appealed the case to the intermediate court of appeals, and the former decision was reversed. The board of examiners then carried the case to the Supreme Court of the state, which upheld the decision of the superior court of the city and county of San Francisco. Homer C. Brown, chairman of the Legislative Committee of the American Dental Association makes the following comment on the case. "This is probably the most important decision relating to the practice of dentistry, ever rendered by a Supreme Court."

The following syllabus of the Supreme Court decision is of interest.

1. The Legislature has the power to regulate the practice of dentistry.

2. The law does not assume to divide the practice of dentistry into the professional and business sides. A corporation or unlicensed person may not legally man-

age, conduct or control the business side of the practice of dentistry.

3. Findings: Parker did aid and abet a corporation and an individual who were not licensed and used false, assumed and fictitious names in conducting the practice.

4. The board of examiners did hold jurisdiction.

5. Delayed action did not annul the law. Methods of Parker has been in litigation for fourteen years.

6. Competency of evidence is not dependent in any way on the means by which it was brought into court.

7. The penalty might seem excessive. The matter was one for the board of examiners, and the order could not be modified.

THE AMERICAN DENTAL ASSOCIATION

The first national dental association, organized in 1859, was composed of twenty-six delegates. In 1874, the membership was 121, and in 1878, 108. In 1897, the National Dental Association was merged with the Southern Dental Association and thus became more nearly national in character. Previous to 1908, the National Dental Association had no direct affiliation with the state societies. The membership varied from 650 to 800. In 1908, a reorganization program was started, which required five years for completion. Thus, in 1913, most state societies had become affiliated, and the membership had increased to 12,500. In 1931, the membership was 35,672, or 53.2 per cent of the estimated 67,000 dentists practicing in the United States.

Since the reorganization, which was completed in 1913, the American Dental Association has been very active not only in elevating the general standard of the profession, but also in obtaining benefits for the individual practitioner. The average individual dentist is not cognizant of the labors and efforts of the organization in his behalf, but looks on the American Dental Association as an institution to which he sends $4 and obtains THE JOURNAL. Beyond that, his ideas of any personal benefits are, at best, but hazy.

It is unfortunate that the individual has not a better conception of what organized dentistry has done and is doing for him. Perhaps some of our dental periodicals have given an undue portion of space to the discussion of scientific articles and too little to the discussion of those other problems which are a part of our professional existence. Those state societies which, for various reasons, do not issue a publication of their own are particularly handicapped in the matter of keeping their members informed. A comparison of our journal with the *Journal of the American Medical Association* will sufficiently illustrate the point in question. The efforts and accomplishments of the American Dental Association should be constantly kept before the profession. Appreciation then should and probably would be shown by an increase in membership.

Time will not permit of a detailed discussion of all the offices, committees, bureaus, councils, boards, etc., which are a part of the American Dental Association, and some division is necessary for the purpose in view. For discussion, these committees, councils, bureaus, etc., have been arbitrarily placed in two major groups. In the first group are those which we shall call non-productive of direct benefits to the individual dentist. In this group, we find such departments as the Judicial Council, Committee on History, National Museum, Economics Committee, Treasurer's Department and Clinic Committee. Each of these have a certain function to perform and are an aid to the organization and to the profession.

That we do not stop to discuss the various committees and bureaus under this heading does not mean that they are unimportant or nonessential, for such is not the case. Many of them are absolutely necessary if we are to have a smoothly operated organization.

The second group we shall call the group productive of direct benefits to the individual dentist. This group may again be conveniently divided into two parts, in the first of which the benefits are nonreducible to a cash value; and in the second of which the benefits are reducible to a cash value.

Returning now to the first part of the second group in which the benefits to the individual dentist are nonreducible, we shall first discuss the Library Bureau.

Library Bureau.—This bureau has literature on every subject in the field of dentistry. The package library affords an opportunity to review the latest literature on any dental subject, particularly those short articles which are not in book form. Before purchasing a book on any dental subject, the reader may borrow from the Library Bureau several books on this same subject, and thus he may be sure that the book he intends to purchase is exactly the one that he desires. The value of the books in the Library is estimated at $10,000. The 1932 cost of operating the Library Bureau was $5,747.52. The Library income was $362.99, the net expense thus being $5,384.53. Of the $4 dues $0.08 is placed in the account of this Bureau.

Process Patent Committee. — The duties of this committee are to examine the lists of various patents which are issued each year in the dental field. Should any patent be granted on a process, the committee will immediately begin to study its effect on the practice of dentistry and take such steps as may be necessary to protect the profession against patentees. The history of the process patent litigation is a long one. It began in 1857, with the Goodyear vulcanite process. In 1884, the Goodyear patents were again renewed. Then followed the litigation with the International Tooth Crown Company, which finally culminated in a victory for the profession, largely through the efforts of J. N. Crouse. This committee had no expense in 1932 and no portion of the $4 dues was given it.

Bureau of Public Relations.—This bureau was formerly known as the Bureau of Dental Health Education. Its activities are listed as follows: It (1) develops friendly relations with other health agencies of national, state and local character; (2) acts in an advisory capacity to departments of health, health organizations and individuals interested in the development of mouth hygiene programs and clinical activities; (3) collects and dispenses various types of data and information pertaining to dentistry, especially that dealing with dentistry in public health; (4) distributes dental health educational material in pamphlet and poster form; (5) conducts a motion picture film and lantern slide rental service; (6) furnishes material for various types of dental talks to lay audiences and assists and advises in development of such talks, including radio talks; (7) prepares dental exhibits and has them available for national, state and local dental meetings, as well as for various types of health shows; (8) reviews any dental plans and outlines of proposed pamphlets and dental programs which are submitted to it, and (9) collects interesting articles for publication in THE JOURNAL, in that section allotted to the Bureau.

Those contemplating the renting or preparation of films and slides should make a contract with this Bureau, as it is in a position to obtain this service at a

considerable reduction in cost. The 1932 cost of the Bureau was $10,384.28. Revenue from sale of pamphlets, etc., was $976.17, the net cost thus being $9,408.11. Of the $4 dues, $0.20 was alloted to this bureau.

Research Commission. — This commission was established in 1913. Its function is to receive applications for assistance in research pertaining to dentistry; pass on the relative merits of the application, as to its problems, facilities and researches; and award grants to promote research. Since 1913, approximately $350,000 has been spent for research, most of this in the field of biology and chemistry. As the research work has been done on a cooperative basis, that is, those receiving grants have been required to equal if not exceed the appropriation, the total expenditure would approximate $1,000,000. Since 1928, especial attention has been given to dental materials, which probably has a more direct application to the specific needs of the individual dentist. Our legislative committee has been successful in obtaining a yearly grant of $10,000 from the Federal government, for the work of the Bureau of Standards, which has been conducting the research on dental materials. The Bureau of Standards furnishes all materials and much technical assistance through various departments that could not be secured in any other way, and at the same time carry the same amount of authority. Federal aid was partially obtained by reason of the fact that the Government is a large user of dental materials through the Army and Navy Dental Corps, the U. S. Bureau of Public Health and the U. S. Veterans Bureau. Approximately 200 dentists are checking clinically the findings of the Bureau of Standards before they are released to the profession. Approximately 50 per cent of the dental material has been found defective, and the same may be said of the technic employed by dentists. The Federal appropriation for this year had been cut to $5,000, but was later increased to $6,500. One of the future programs of the Research Commission provides for cooperation with the U. S. Public Health Service and the recently created National Institute of Health, to which five dentists have recently been appointed as consultants in dental research. One of the most outstanding facts established by research in the past fifteen years was that infection in the mouth, particularly around pulpless and abscessed teeth, can and does become transmitted to other parts of the body, causing kidney and heart diseases. If the 67,000 dentists in the United States will on the average purchase and use 20 ounces of amalgam a year, this particular research alone will pay for itself, also enabling the dentist to buy materials of a known standard of value. This work will save the profession millions of dollars and will save the patient's teeth as well, since an amalgam that shrinks invites decay. The 1932 cost of maintaining the Commission was $16,480.33. Of the $4 dues, $0.33 went to the Research Commission.

Bureau of Chemistry and Council on Dental Therapeutics.—This Bureau and Council may be conveniently grouped. The first named body investigates dental remedies, furnishes chemical analysis of secret formulas and answers queries relative to dental remedies. The Council passes on therapeutic claims of proprietary remedies and publishes their findings in THE JOURNAL, and is making a compilation of the accepted remedies. There has been recent action by the Pure Food and Drug Department of the Department of Agriculture whereby certain nostrums shipped interstate have been seized and, if not redeemed, destroyed. These activities of the Department of

Agriculture are indicative of the protection to the purse and health of the public which may be expected of this branch of the Government, if the officials in charge of the enforcement work are convinced of the stand of organized dentistry on unwarranted claims of curative properties made in connection with the sale of these products. In the last three years, the activities of the Administration in this direction have been greatly extended, a statement that the activities of the dental profession as expressed through the report of the Council on Dental Therapeutics and the Bureau of Chemistry have given the officials a feeling of confidence in investigating products put out with dental claims which are not permissible in the existing state of sound professional opinion is not an idle conjecture. In the perusal of these abstracts of Notices of Judgment, it should be recalled that the officials of the Food and Drug Administration are guided in the enforcement activities by legal limitation. The law limits its investigation of the department in this sphere to products which pass in interstate commerce and to statements made on the principal label or on circulars or other advertising matter immediately surrounding the container.

The members of the profession can assist themselves and the public by prescribing and using only those remedies which have been accepted by the Council on Dental Therapeutics. Those samples received through the mails or from detail men should not be placed in the hands of the patients. The 1932 cost of the Bureau of Chemistry and Council on Dental Therapeutics was $15,345.15. Of the $4 dues, $0.20 was given to the Council and Bureau.

Dental Relief Fund Committee and the Dental Relief Fund Commission.—This committee and commission may properly be considered together. The first named is instrumental in obtaining the relief funds, largely from the sale of Christmas Seals. This committee receives no allowance and is therefore obliged to advance the necessary amount for expenses or deduct the expense from contributions. The original capital is invested in interest bearing securities, the interest alone being used for relief purposes. The Relief Commission receives, records and investigates applications, cooperates with state and local organizations for thorough investigation of applications, approves or disapproves the request and determines the amount of payments. A total of eighty members have received $36,745.82 from the Relief Fund at a cost of less than $0.50 per member. June 30, 1932, the total amount of the fund was $289,555.89. Last year, Montana contributed $52, or an average of $0.48 a member. A complete list of donations by states appears in the December 1932 issue of THE JOURNAL. Montana's total contribution to the fund has been $380.50, and we have received in grants $184.50 up to that date. Up to Jan. 1, 1933, we have expended from our own state relief fund $224.50, two members of our state association being the recipients. We have also agreed to expend $90 during the coming year. The 1932 cost of the Relief Commission was $393.56. No part of the $4 dues is used for relief.

This completes the discussion of part one of group two. Let us now discuss the second part of group two, those benefits reducible to a cash value.

Administration, Business Office and Annual Meeting.—Under administration, we have the Secretary's office, business office and Transportation Committee. The Secretary's office is a clearing house for all the activities of the Association. The business office works in conjunction with the secretary's office,

its function being self explanatory. The Transportation Committee has always obtained a reduced railroad rate for those desiring to attend the annual meeting of the Association. This rate has usually been one and one third fare for the round trip, unless a lower excursion fare was already in effect. The 1932 expense of administration was $28,351.97. Of the $4 each member pays as dues, $0.46 is used for administrative expense. The annual meeting of the American Dental Association offers much the same advantages as the state society meetings, but of course is many times larger, and more diversified as to both clinics and exhibits. The 1931 expense of the annual meeting was $26,596.65. Of the $4 dues, $0.56 was used for a part of the expense. Those who attend the annual sessions of the American Dental Association are saved $38.40 by the Transportation Committee through a reduction of railroad rates. This figure is estimated on mileage of one-half the distance across the continent.

The Journal.—THE JOURNAL has each year about 2,000 pages of original communications. This is the equivalent of four 500-page books. A book of this length ordinarily sells for from $7.50 to $12.00, this depending on the number of illustrations, etc. As THE JOURNAL is profusely illustrated, this reading matter in book form would cost at least $40. The subscription price is $1.25. The 1932 cost of issuing the Journal was $87,417.68. Of the $4 dues, $1.60 goes to THE JOURNAL fund. (As an offset to this expense, it should be noted that the sum of $63,538.45 was received for advertising in THE JOURNAL, which naturally reduced the cost to the members very materially.)

Group Life Insurance.—Through the efforts of the Group Insurance Committee, those who have subscribed to this insurance have provided themselves with protection and security at a reduced cost. Some dentists have thus been able to obtain this protection who could not have otherwise secured it. At the present time, it is impossible to obtain definite figures on the number of dentists in Montana who are carrying this insurance. The committee secretary states that there are ninety-one who do not; therefore, it would appear that about thirty of our members do carry it. At the age of 25 years, the $3,000 policy may be had at a saving of $15.17 a year, and for an older age, the savings are even more. Two known cases may be cited to illustrate the benefits derived by the individual carrying the insurance.

CASE 1.—For a member aged 52 years, the cost of $3,000 of term insurance would be $120. The same insurance under the group policy would cost $32.50. In this case, the saving is $87.50.

CASE 2.—For a member, aged 48, the cost of $3,000 of term insurance would be $92. This amount under the group policy would cost $32.50. This individual is saved $59.50 a year, and, in addition, the holder of this policy states that it is his belief that he would be unable to obtain this insurance from any other source.

Legislative Committee.—The activities of this committee have been numerous and varied, and they have aided other committees, particularly in the matter of obtaining Federal grants and aid. The American Dental Association has approved the following problems, but the economic situation makes it inadvisable to attempt to promote them until general conditions are greatly improved: 1. That the contributions of Drs. Wells and Morton as discoverers of the anesthetic properties of nitrous oxide and sulphuric ether be appropriately recognized and memorialized by our Government. 2. That the personnel of the Army and Navy Dental Corps be sufficiently increased to render a more adequate serv-

ice. 3. That the rank of brigadier general be provided for the Army Dental Corps. This was recommended and approved with special reference to Col. Robert Todd Oliver, retired.

A further study of the Legislative Committee may be best undertaken by segregating the various activities under separate headings.

Congressional economic program: In an effort to balance our national budget, Congress has attempted to reduce expenses. Our Legislative Committee has supported the opposition to a pension for widows and orphans of veterans dying of nonservice connected disabilities, and have also recommended repeal of hospitalization and disability allowances for nonservice connected cases. The full meaning of this action may be had by reading the article "Government Competition With Private Practice" by E. L. Aison, which appeared in the January, 1933 issue of THE JOURNAL. The American Medical Association and our own Association have united on a program favoring the use of private hospitals, instead of building new ones for the care and treatment of veterans. Our Legislative Committee has also gone on record as favoring a change of the bankruptcy law, wherein the procedure would be simplified and special attention would be given to those items known as the necessities of life, dental service being considered as such a necessity. As regards that part of the economic program wherein it was proposed to make salary reductions apply to dentists in the Federal services, our Trustees and Legislative Committee has adopted a policy of hands off.

Uniform state dental laws: The Legislative Committee has been recently reorganized and renamed, being now known as the Committee on Legislation and Correlation. The reorganization has provided for this committee cooperating with state societies, and it is hoped that a closer affiliation between the Committee and the state associations will assist in securing more uniform dental laws, and dental education, and thus assist in some reasonable and practical reciprocity arrangement. The Committee is also empowered to cooperate with state medical and dental societies where the right of corporations to practice medicine and dentistry is concerned.

Tax on gold: In 1917-19, two attempts were made to place an excise tax of 50 cents a pennyweight on new mined gold. These bills were sponsored by the American Mining Association. Our Committee joined others in successfully opposing this legislation. Again, the Bureau of Internal Revenue considered placing an interpretation on Section 605 of the Revenue Act of 1932 imposing a tax on dental services wherein precious metals were used. The Legislative Committee presented the commissioner of the bureau with ten specific reasons why dental services should be considered as a health measure and therefore not subject to a tax, as a luxury, under the Revenue Act.

Sales tax: At the 1932 session of Congress, a sales tax was proposed as a substitute measure for the revenue bill before the Senate. The Legislative Committee strongly urged that dentistry be classed as a health service and exempted from the sales tax; but this substitute proposal was finally defeated by a very close margin. Dental proprietary products were also scheduled for an excise tax of 10 per cent as luxuries, but a compromise on 5 per cent was eventually effected and so stands at present.

Income tax: The Legislative Committee, in collaboration with other professional groups, obtained a deduction of traveling expenses incurred in attending professional meetings from income tax reports, by a decision of the U. S. Board of

Tax Appeals, which changed the ruling of the Treasury Department.

Narcotic license: In 1928, the Legislative Committee cooperated with other groups and obtained a reduction of $2 in the narcotic license tax. Since that time, an unsuccessful attempt has been made to restore the tax to $3.

The various activities of the American Dental Association have been briefly covered and the apportionment of your $4 dues has been shown, and placed in such form that each of you may easily determine for yourselves just what the organization has done for you.

Manifestly, a detailed statement of all the activities of the various committees cannot be enumerated for lack of space, but enough has been outlined to prove the great advantage of membership in organized dentistry.

409 Ford Building.

CELLULITIS*

By STERLING V. MEAD, D.D.S., Washington, D.C.

CELLULITIS, an inflammation of the areolar connective tissues, may be found in any area where there are cellular tissues, particularly the neck.

OCCURRENCE

Cellulitis may occur at any age. It may be either primary or secondary, superficial or deep, diffuse or circumscribed, preacute, acute, subacute or chronic. There is an early stage of infection having the possibility of terminating in an acute cellulitis that may be considered a preacute stage. Early interference and treatment may in some cases abort an infection in the preacute stage of cellulitis. Acute cellulitis usually occurs as a diffuse phlegmon or a purulent infiltration with a widespread suppurative inflammation of the subcutaneous cellular tissues. In some cases, there is no formation of pus, and in some it is characterized by a circumscribed form of infection. In the acute circumscribed type, the tissues often suppurate and slough away, but the process remains localized. In the subacute type, there is a lessening of the intensity of the infection, and the symptoms are usually those due to conditions ranging midway between an acute and a chronic infection.

Chronic cellulitis is always circumscribed. It may follow the acute form or it may occur as a primary chronic infection due to some long-continued irritation.

ETIOLOGY

Cellulitis is usually the result of an infection in the mouth, either periapical, periodontal, pericoronal or residual. In some cases, it may be due to an infection of the maxillary sinus or one of the sinuses or the tonsils. It may spread through the lymph glands, especially the submaxillary lymph glands and the superficial cervical glands, and a secondary infection of the cellular tissues may result from these structures. I have observed three cases in which a definite

*Read before the Section on Oral Surgery, Exodontia and Anesthesia at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 14, 1932.

cellulitis has developed without any apparent or recognized definite cause, all the usual sources of infection being ruled out.

I have observed other cases which were caused by the presence of stones or by infection in the ducts of the salivary glands, especially the submaxillary gland.

Cellulitis and adenitis are closely related. An adenitis may extend to a cellulitis, and either of these two conditions may result in septicemia.

There is a close relationship between severe types of cellulitis and septicemia,

Fig. 1.—Acute cellulitis.

the more severe cases of cellulitis being apt to terminate in septicemia. There is a great deal of evidence that organisms do appear in the circulation periodically from certain lesions, and some of these cases do not give any marked symptoms because of the high dilution and the rapidity with which the organisms are removed from the circulation. In these cases, it is difficult to locate the organisms by means of blood cultures. The fact that they are found in the blood culture does not therefore entirely signify a septicemia, as it is necessary to consider the finding of organisms together with the clinical symptoms of the patient in order to make a diagnosis. In some cases, the clinical symptoms may point definitely to septicemia when the blood culture is negative even up to seventy-two hours and longer, and the patient may even die of septicemia before the blood culture is positive.

Cellulitis results from the introduction of some organism, commonly *Streptococcus pyogenes,* into the cellular connective tissue of the integument, intermuscular septums, tendon sheaths or other structures.

The progress of a case of cellulitis is dependent on: (1) the type of organism; (2) the virulence of the organism and (3) the physical resistance of the individual.

Fig. 2.—Acute cellulitis.

It is an interesting fact that while the staphylococcus usually causes a localized abscess either at the site of the infection or in the lymph glands, the streptococcus usually gives rise to this diffuse form of inflammation. This is because the staphylococcus produces a greater chemotaxis and so a larger number of leukocytes are massed at the site of infection. This prevents the spread of the inflammation and tends to the formation of a localized abscess.

The organisms found in cellulitis may

be *Staphylococcus albus* or *aureus* or any of the different types of streptococci. In other cases, both the streptococci and staphylococci may be present in the infection and other mouth organisms will appear. In general, streptococcic infection is the more virulent form, but streptococcic cellulitis may appear in various forms; in some cases, being very mild, others, severe.

Infection in the real sense is not determined by the presence of organisms, but by the tissue reaction of the tissue involved.

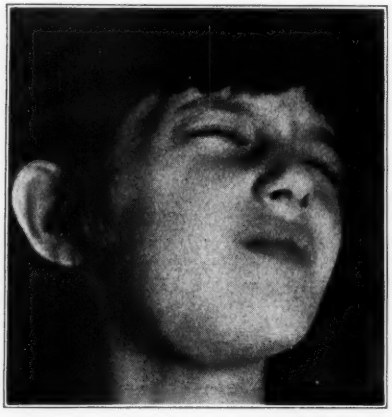

Fig. 3.—Cellulitis.

The less severe varieties of cellulitis are often due to the presence of staphylococci. The virulence of the organism and the general condition of the patient determine the extent and severity of the process.

Cellulitis in the region of the mouth, face and neck is often associated with removal of teeth or dental trauma of some other nature. While the cellulitis may be due primarily to trauma, it is quite often found that the trauma has just occurred incidently to the infection, which may have occurred anyway, and in many cases does so.

SYMPTOMS

Usually, a case of acute cellulitis develops rather rapidly. The symptoms may appear within a few hours or not for two or three days after the infection of a wound. The inflammation usually spreads rapidly. I have seen cases requiring drainage that had developed in less than twenty-four hours. Others that I have observed progressed very slowly and lasted for about ten days when exploratory incision did not show

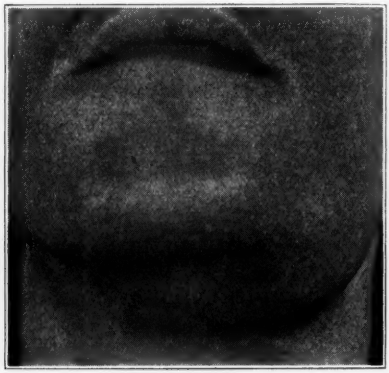

Fig. 4 (Case 4).—Appearance of patient; showing condition of cellulitis.

pus, but only black congested blood, the symptoms subsiding immediately thereafter.

Cellulitis may spread rapidly and extend over the entire side of the face; or it may even spread to the opposite side of the face. It may begin as an adenitis of one of the submaxillary glands and, within a few hours, it may jump to the submaxillary gland of the opposite side of the face. In other cases, the symptoms develop slowly, in the form of a localized cellulitis or adenitis, spreading to either a diffuse or a circum-

scribed form of cellulitis in different parts of the face or neck. Trismus is usually present in varying degrees. There is usually intense pain, which is exaggerated when pus is present. There is usually great swelling and edema, the tissues have a dusky redness and there is an elevation of temperature. The lymphatic vessels running from the area are congested, and the glands into which they empty become painful and swollen. Suppuration may spread not only beneath the skin and mucous membrane, but also between the muscles and fascia, and even to the bone. In some cases, there is a tendency to wall off the area of infection; in other, more severe, cases, there is a tendency to a gangrenous con-

Fig. 5 (Case 4).—Intra-oral roentgenogram showing beginning periapical osteitis.

dition without pus or with very little. When the tendency to gangrene is marked, the condition is known as gangrenous cellulitis. When there is gas in the tissues, the condition is known as gas gangrene. The constitutional symptoms are those of septic intoxication or septicemia. Pyemia occasionally develops.

The first symptom is possibly a chill, followed by a rise in temperature to from 100 to 105 F., occasionally higher with a pulse proportionately increased, but usually feeble and often irregular. In some cases, the chill is not apparent. The face is flushed, the tongue is dry and brown and there is frequently delirium. The local symptoms are intense pain, swelling and edema of the skin, which assumes a dark red hue. To the touch, it is firm and hot, and there is tenderness. There is also local burning pain. The approximal lymphatics are usually enlarged and tender. As the pus spreads, the skin or mucous membrane becomes soft and boggy. It may eventually break, discharge of a thick pus or liquid resulting.

The inflammation spreads rapidly through the cellular tissues. Pus formation usually, but not always, follows, and abscesses form and burrow in all directions under the skin. The extension is usually confined to the areolar tissues.

Fig. 6 (Case 5).—Appearance of patient; showing condition of cellulitis.

In some cases, there is a tendency to extension entirely through the lymphatics. Sloughing of tissues of low vitality, such as fat, fascia or tendon, is quite common.

In extreme cases of cellulitis, there may be a destruction of tendons, ligaments and fascia which have been involved in the necrotic area, functional usefulness of the part coming to an end on account of the presence of adhesions and sloughing.

The constitutional symptoms are in proportion to the size of the area of involvement or to the absorption of

toxins of the bacteria. The general symptoms, which are those of acute inflammation and infection, are usually more severe than in a case of localized abscess.

Chronic cellulitis is characterized by a more circumscribed area of inflammatory reaction, where the infected area has a tendency to become localized. In some cases, the presence of pus is easily detected; in others, slight swelling or soreness may exist for some days without the usual signs of suppuration.

DIAGNOSIS

It is most important to keep in mind that there is no general characteristic form of cellulitis, and that the symptoms

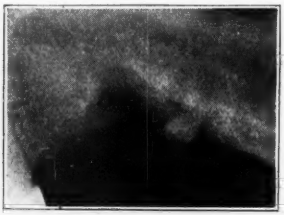

Fig. 7 (Case 5).—Intra-oral roentgenogram showing root in lower molar area and osteitis.

may range from very mild to very severe. Cellulitis may occur as a variation or an extension of an adenitis, a spreading of different forms of mouth infection, traumatism, wounds, etc.

The factors involved in cellulitis may also be the etiologic factors in the septic phlegmon of Gensoul, or Ludwig's angina. It is not always possible to determine, in the beginning stage, whether a typical septic plegmon of Gensoul or Ludwig's angina will result. The plegmon of Gensoul's or Ludwig's angina is in reality an exaggerated and more severe type of cellulitis which develops into a condition involving structures that give a more serious picture and one more difficult to treat.

The Gensoul or Ludwig type progresses rapidly. Usually within three or four days, the neck becomes so swollen and painful that respiration is difficult. The tongue is thick and swollen and there is difficulty in opening the mouth. The disease is usually accompanied by very high temperature and septic symptoms and frequently terminates fatally. Sometimes, interference with the circulation is so great that local gangrene results. Dyspnea may be caused by pressure on the trachea.

Fig. 8 (Case 6).—Appearance of patient; showing condition of cellulitis.

Cellulitis may be complicated by toxemia, septicemia or pyemia.

The presence of pus in cellulitis cases is determined by both local and general signs. Whenever fluctuation occurs, it should be carefully studied, as most cases of cellulitis are accompanied by induration and edema, which may mask the local signs or the presence of pus.

By fluctuation, the peculiar sense of the presence of fluid observed when a loose bag of fluid is pressed alternately with a finger of each hand is meant. On pressing downward with one finger,

a definite upward impulse is transmitted to the other owing to the increased tension produced by the pressure of the first finger. The detection of fluctuation requires some little practice, and there are certain interpretations which may prove disappointing. A sense of fluctuation may be obtained under certain conditions, even though no fluid is present.

When fluid is under extreme tension, the resulting swelling may be so hard that no fluctuation can be detected. Under such circumstances, it may be impossible to say with certainty whether it be solid or fluid. If the abscess is situated deeply, the detection of fluctuation may be prevented by the overlying tissues.

Fig. 9 (Case 6).—Extra-oral roentgenogram showing periapical osteitis of lower first and second molars and impacted third molar.

If the abscess is acute and near the surface, the skin over it will be red, thin and shiny. There will be increased heat, and all the phenomena of acute inflammation. If it be chronic, the skin will be perfectly normal until the very late stages and the case will present itself as a fluctuating swelling, which may or may not be associated with a little pain and tenderness.

Trismus in connection with an acute inflammatory condition should suggest the probability of localization of pus in the peritonsillar area or along the course of the masseter muscle.

DIFFERENTIAL DIAGNOSIS

Acute diffuse cellulitis is in the beginning stages often indistinguishable clinically from cellulocutaneous or phlegmonous erysipelas.

Clinical experience impresses one with the relationship of cellulitis, Ludwig's angina and noma. There is reason to believe that Ludwig's angina and noma are the terminal result of infections starting as a cellulitis or adenitis in patients of lowered resistance. In other words, with proper treatment, cellulitis and adenitis in patients of good resistance usually responds to treatment. If the general resistance is low, the condition, in spite of proper treatment, may extend to a more severe type of local destruction or gangrene with the classic picture of either a Ludwig's angina or noma.

Fig. 10 (Case 7).—Appearance of patient; showing condition of cellulitis.

It is possible that in many cases of cellulitis or adenitis which present possibilities of Ludwig's involvement this stage is not reached because of treatment instituted. It is also possible that many cases of severe cellulitis do not present the classic picture of, and are not recog-

nized as, true Ludwig's angina, or, in some instances, the patient may die because of septicemia or an early developing pneumonia.

PROGNOSIS

Deep cellulitis or abscess is often of the gravest nature because of the danger of extension to the axilla, mediastinum or pleura; rupture into the trachea or esophagus, or edema of the glottis. External fluctuation and pointing are the exception. In some cases, death will result even with the most careful treatment. The resistance of the patient is of great importance, and, in some cases of lowered resistance, it is impossible to control the infection. The more nearly

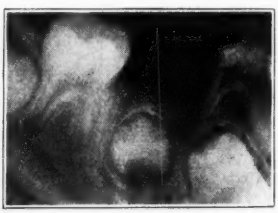

Fig. 11 (Case 7).—Intra-oral roentgenogram showing area from which lower second deciduous molar was removed.

the cellulitis approaches the Gensoul or Ludwig type, the greater the danger. A leukopenia is a danger signal, and the lower the leukocyte count, the more unfavorable the prognosis. This is especially true as the case approaches the agranulocytic type.

TREATMENT

The preventive treatment of cellulitis consists in thoroughly disinfecting all instruments, dressings and the field of operation, and preoperative treatment of the tissues involved. Another important preventive measure is the use of great caution in operating in the presence of acute infection, wherever possible reducing acute symptoms through drainage and irrigation and other forms of treatment before any operative procedure, such as extracting teeth. Quite often, cellulitis may be prevented by recognition of the physical condition of the patient and proper treatment, including rest, medication, diet and forcing of liquids, and by the use of a warm mouth wash every two hours and superficial drainage if possible.

In cellulitis, immediate diagnosis is advisable by the use of all necessary roentgenograms and the necessary examinations. As much of the infection as possible should be eliminated without surgical intervention. In other words, if there is a pericoronal pocket around the third molar, irrigation should be carried out. If a maxillary sinus is filled with pus, it should be irrigated and drainage established. Any definite throat symptoms should be treated. Infection in a tooth should be treated if possible by opening into the canal and placing a wick of cotton saturated with guaiacol alone or with glycerin or creosote.

Wherever there is definite congestion in the mouth, the area affected should be lanced. In many cases, by pressing the points of sharp-pointed cotton pliers under the gingival margin around the area involved, congested blood or even pus may be drained through the opening made, without definite incision. In other cases, it may be necessary to put the point of the lancet through the superficial tissue in order to provide drainage. In some cases, drainage may be established through the root canal.

In the beginning stage of cellulitis, or when it is possible to treat the infection within the mouth, cold packs on the face are indicated.

If the cellulitis continues to develop under cold packs over a period of from six to twelve hours, it is well to alter-

nate packs of hot and cold, using a saturated solution of magnesium sulphate. If the swelling continues, it is well to adopt continuous hot applications of magnesium sulphate.

In the milder varieties of cellulitis, hot, wet magnesium sulphate dressings may prevent suppuration. In the more severe forms, they will tend to limit it.

Cellulitis may, in many cases, be avoided by opening and draining infected wounds.

Where pus is present in the early stages, incision is indicated, unless the severe symptoms of the patient contraindicate the incision. In some cases, such as infections of the upper lip, or when the patient's condition is serious, and the infection is liable to resemble a septicemia, or it spreads from one submaxillary gland to the opposite side of the face and does not have a tendency to localize, incision is not indicated until a later period.

The question as to the manner and time of surgical intervention is important, but it is difficult to lay down any hard and fast rule as clinical experience is necessarily the determining factor.

There is a time during the early period of cellulitis or septicemia when liquefaction or pus formation has not taken place and leukocytosis is in progress. In this stage, the patient complains of excruciating pain and the temperature rises perhaps a degree or two every twenty-four hours. Surgical intervention is not advisable until the symptoms point to a localization of pus. After liquefaction, there is usually a drop in temperature, even though for but a short period. One cannot always wait for a drop in temperature before making an incision, as the temperature may not drop. In some cases, pus may be forming in several cavities or pockets in the same locality, and each of these areas present different stages.

The two cardinal principles to be observed in the treatment of abscess and cellulitis are incision and drainage. The incision, which should be made as soon as possible after the presence of pus is considered a certainty, should be large enough to thoroughly evacuate the pus. It should be made, if possible, at the most dependent portion of the abscess that gravity may aid in drainage. Extreme care should be exercised when local areas develop as a result of septicemia or erysipelas, early incision into these areas being contraindicated.

Incision should be made at the most appropriate place for adequate drainage, the question of the after-results as far as the scar, etc., is concerned, being taken into consideration. If the cellulitis is superficial, it is in some cases most satisfactory to make the incision directly over the area involved. In other cases, if the cellulitis is deep in the fascia or below the fascia and deeper structures, or there are many important structures in the neighborhood, the method known as Hilton's should be adopted. This consists in an incision with the knife through the skin only, a pair of hemostatic forceps being then plunged deeply into the abscess. By a diverging of the blades of the forceps, an opening large enough for drainage may be made without the risk of cutting into important nerves. After going through the overlying structures with a small blunt hemostat and opening the incision and enlarging it with a larger size hemostat until the opening will admit the little finger, the tissues are spread apart and the pus is located either by gently exploring with the blunt hemostat or, in some cases, where the pus is well hidden and very deep, by using the finger to retract the tissues and enlarge the opening.

After the incision has been made, it is usually best to use drainage tubes of some nature. This is especially true in the deeper cases of cellulitis. In the superficial cases, it is sometimes found necessary. After the incision is made and the hemostat has been pushed into the deeper layers, and the tissues are opened up by a blunt dissector so that the area of infection is thoroughly drained, a fenestrated rubber tube of suitable size should be inserted. It is sometimes necessary to make a second incision so that the tube can be put through and through, into one opening and out the other. When the operation is done on the outside of the face below the jaw, the one opening may be made from within the mouth outward to the outside of the face so that the wound can be irrigated. The number of incisions, of course, depends on the extent of the area of localization and on the length of time the infection has been progressing. It will be found that in cases which have existed for several days, the acute symptoms having changed to those of a chronic nature, drainage for a longer period will be required.

In some cases, it is necessary to leave the drainage tubes in for only six hours; in others, it is necessary to leave them in for twenty-four hours, and in still others, it may be found necessary to leave them in for forty-eight hours. In certain cases, it may be necessary to remove the first tubing at the end of twenty-four hours and insert another tubing, which is usually smaller. As long as drainage is free, it is best to leave the tube in. It may be advisable in some cases to remove the tube, clean it and put it back, but if there is not sufficient drainage, it is sometimes necessary to remove the tube entirely. In these cases, leaving the tube in for a few hours will at least have a tendency to hold the edges of the incision apart, so that its drainage may proceed.

ROENTGEN-RAY TREATMENT

Acute cervical lymphadenitis is occasionally seen in children, secondary to infection of the upper respiratory tract. These cases may proceed to the stage of suppuration or develop into a type of cellulitis.

For some time, many physicians have been advocating roentgen-ray treatment for inflamed lymph glands, and from recent experimental work, it has been shown that the roentgen rays are valuable also in the treatment of cellulitis.

In the early experimental work, it was found that heavy roentgen dosage caused an aggravation of acute cases, and it was argued that small dosage could not be of benefit when heavier dosage failed. Roentgen therapy was therefore thought to be contraindicated in acute inflammatory conditions.

Minimal doses are essential. The average dosage given by Dr. May in his cases of acute cervical lymphadenitis was 20 per cent of one skin unit dose on the surface, with the use of from 150 to 180 kilovolts, 0.5 mm. zinc or copper plus 3 mm. aluminum filter and a focus skin distance of 30 cm. This dose is equivalent to 260 R units, one skin unit dose being equal to 1,300 R units ("R unit" means the international roentgen unit). The surface treated was always larger than the area of inflammation. As a rule, the younger the child or the more acute the inflammation, the smaller the size of the dose given. When required, a second treatment was given after an interval of from five to seven days.

Roentgen rays have both general and local effects. The general effect is nonspecific stimulation of the immunizing power of the body. The local effects

are a dilatation of the blood vessels and a hyperemia with a resultant increase in the flow of blood and lymph, bringing the natural defensive powers of the body to the inflamed area.

Acute cervical lymphadenitis is almost always of prolonged duration. Roentgenization accelerates the inflammatory process, so that there is either rapid resolution or rapid breaking down.

Roentgenotherapy cannot supplant it.

All observers note that roentgen-ray treatment not only accelerates the local inflammatory process, but also relieves pain and discomfort. An improvement in the constitutional symptoms takes place, and, in most cases, there is a decided drop in temperature in about forty-eight hours. The analgesic effect of the roentgen rays is well known. The earlier the treatment, the more favorable the result, and the results are more striking in young children than in older children or adults.

The action of the roentgen rays on inflamed tissues has not been explained definitely. It is known that they do not kill bacteria, at least not in the dosage to which the human body can be exposed. Pordes' theory is that the leukocytes are very sensitive to the roentgen rays. When the inflamed area is irradiated, even in small doses, the white blood cells break down and the bacteriolysins and antitoxins are released and become effective.

The treatment given at Georgetown Hospital is the same for acute or chronic adenitis or cellulitis, with or without fever: 5 milliamperes, 7 inch spark gap, 5 minutes' time, 10 inch distance, 3 millimeter aluminum filter; repeated weekly.

CELLULITIS WARD ROUTINE

The routine care of these cases comprises: rest in bed; liquid diet and orange juice, at least 30 ounces a day; use of milk of magnesia or a soapsuds enema as indicated; use of a warm mouth wash every two hours; cleaning of the teeth with a soft brush and soapy tooth paste or powder three times a day; painting of the local area with 3.5 per cent iodine, 10 per cent mercurochrome or tincture of metaphen at least three times a day; adequate treatment of pain; intra-oral and extra-oral roentgenograms; complete blood study; urinalysis; temperature records; physical examination and the use of cold packs in beginning stages and hot magnesium sulphate compresses if swelling continues.

REPORT OF CASES

Case 1 (Fig. 1).—*History.*—A girl, aged 9 years, came in, Oct. 26, 1932, with a swelling in the region of the left submaxillary gland and on the side of the face. A severe toothache had developed two days previously, becoming worse the following day, with extensive swelling of the left jaw. Pain and swelling had continued to increase.

The father, the mother, three brothers and seven sisters were living and well. One brother had died of heart disease and one sister of pneumonia. The patient had had measles, mumps, whooping cough, chickenpox and pneumonia in 1925. She suffered from recurrent toothache.

Examination.—The physical examination was essentially negative. The temperature was 100.2 F. Blood examination revealed: red cell count, 3,550,000; white count, 12,220 (lymphocytes, 15 per cent; polymorphonuclears, 84); hemoglobin, 65 per cent. The urine was amber colored, clear, of acid reaction, with a specific gravity of 1.015; free of albumin and sugar, and containing epithelial cells and an occasional pus cell.

Diagnosis.—Acute cellulitis was diagnosed.

Treatment.—The patient was sent to the hospital immediately. Liquids were forced and hot magnesium citrate packs were applied to the face. Operation was scheduled for the following morning at 8 o'clock. On admission, the temperature was 100.2, pulse 126, respiration 24. The patient was given an alcohol rub and put to bed. When she was seen at 11:30 p. m., the temperature was little changed, and she was fairly comfortable. Luminal, 1 grain, was prescribed. At 1:30

a. m., the patient screamed and collapsed. The temperature was at that time 107 F.; pulse, 180; respiration, 40. The patient was perspiring profusely. She gradually regained partial consciousness, then became delirious. At 2:30 a. m., an extra-oral incision was made and a drainage tube inserted. The use of fluffs of gauze saturated with hot magnesium sulphate and changed every fifteen minutes was prescribed.

Outcome.—The patient was discharged from the hospital, October 31. Treatment was continued at the office, consisting of irrigation and dry dressing. The case was dismissed, November 15.

CASE 2 (Fig. 2).—*History.*—A woman, aged 36, came in with a complaint of acute swelling in the submaxillary gland region of the right side and swelling in the floor of the mouth.

Examination.—The temperature was 102. Blood examination revealed: red cells, 3,800,000; hemoglobin, 80 per cent; white cells, 7,200 (polymorphonuclears, 65 per cent).

Diagnosis.—Acute cellulitis, with swelling of the right side of the face and neck, was diagnosed.

Treatment.—An incision was made in the floor of the mouth just opposite the first molar, without anesthesia. The wound was kept open for four days, and the first molar was then removed under general anesthesia. The swelling receded.

CASE 3 (Fig. 3).—*History.*—A girl, aged 15, came in, Oct. 27, 1931, complaining of swelling on the right jaw, with pus pointing beneath the skin. There was pain and trismus. The swelling had been present ten days, dating from the removal of the lower right first molar.

Examination.—The temperature was 102; the blood count as follows: red cells, 4,600,000; white cells, 9,500 (polymorphonuclears, 80 per cent). Hemoglobin was 78 per cent.

Diagnosis.—Cellulitis was diagnosed.

Treatment.—October 27, under nitrous oxide-oxygen, the face was lanced and a rubber tube inserted for drainage. October 28, the drain was removed and the wound irrigated. Treatment was continued daily until November 3, and two days later the case was dismissed.

CASE 4 (Figs. 4-5).—*History.*—A young man came in for treatment, Aug. 16, 1930, complaining of swelling on the left side of the face, under the jaw in the submaxillary gland region, with pain. The area had been swollen about a week.

Examination.—The temperature was 103; blood count: red cells, 4,000,000; white cells, 7,000 (polymorphonuclears, 70 per cent). Hemoglobin was 80 per cent.

Diagnosis.—Acute cellulitis was diagnosed.

Treatment.—August 16, the patient was hospitalized. An incision was made on the outside and a drain tube inserted. August 17, the tube was removed and the wound irrigated with saline solution. The treatment was given daily until August 24, when, under local anesthesia, the lower left first molar was removed. September 1, the case was dismissed.

CASE 5 (Figs. 6-7).—*History.*—A woman, married, aged 42, came in, Oct. 6, 1930, with swelling of the face accompanied by fever. The affected area was fairly well pointed under the lower border of the mandible in the first molar region.

Examination.—The temperature was 99, the pulse, 80. Blood analysis revealed: red cells, 4,500,000; white cells, 7,800 (polymorphonuclears, 75 per cent); hemoglobin, 80 per cent. Roentgen-ray examination of the upper right first molar region revealed periapical osteitis.

Treatment.—October 6, under nitrous oxide-oxygen, the affected area was incised and a small rubber drain tube inserted. The following day, the tube was removed. The area was treated daily until October 20. October 21, under nitrous oxide-oxygen, the lower right first molar was removed. October 27, the case was dismissed.

CASE 6 (Figs. 8-9).—*History.*—A girl, aged 14, came in for treatment, Feb. 16, 1931. The chief complaint was a soft swelling under the jaw near the angle on the right side, with soreness and some pain, but no trismus. The condition had developed about ten days before, with soreness around the lower right molars. Home treatment had been instituted.

Examination.—The temperature was 100; blood count: red cells, 3,550,000; white cells, 6,500 (polymorphonuclears, 60 per cent). Hemoglobin was 78 per cent.

Diagnosis.—Cellulitis, circumscribed, was diagnosed. Intra-oral and extra-oral roentgenograms revealed periapical osteitis of the lower right first and second molars.

Treatment.—February 16, under nitrous oxide-oxygen, an incision was made outside. As the pus was near the surface, a drain tube was not inserted. A hot saline mouth wash was used every three hours, and 2 ounces of magnesium sulphate given. The patient was

put to bed. February 16 to 21, treatment was given daily. February 22, under procain, the lower right first and second molars were removed. February 22-26, the mouth was irrigated. March 3, the case was dismissed.

CASE 7 (Figs. 10-11).—*History.*—A girl, aged 6, came in, Jan. 28, 1931, complaining of swelling of the left side of the face involving the submaxillary gland. The lower left second deciduous molar had been removed one week previously, in bad condition.

Examination.—The temperature was 99.2; blood count: red cells, 4,600,000; white cells, 9,500 (polymorphonuclears, 84 per cent). Hemoglobin was 80 per cent.

Diagnosis.—Cellulitis was diagnosed. Intra-oral roentgenograms showed that the second deciduous molar had been removed and there was beginning caries in the first deciduous molar. The physician wished to treat the case by rubbing salve (ichthyol) on the face.

Treatment.—January 28, under nitrous oxide-oxygen, an incision was made on the outside and drainage tubes were inserted. The following day, irrigation with warm saline solution was instituted. January 30, the tubes were removed, and from then until February 4, the wound was treated daily. February 5, the case was dismissed.

DISCUSSION

Charles M. Proctor, Boston, Mass.: The presentation of this paper to the Section on Oral Surgery, Exodontia and Anesthesia is particularly timely. So important do I consider the subject of all infective processes in their relationships, both local and general, that I believe there should never be a meeting of the American Dental Association at which some phase of infection is not discussed. A chronic process of infection allows the surgeon ample time for study and reflection as to the treatment of the case. An acute infective process is an immediate challenge to the surgeon, the treatment calling for quick, courageous and radical action. To temporize is to invite a prolongation of the case if not actually to jeopardize the life of the patient. Great emphasis should always be placed on the early and radical treatment of acute cellulitis, especially of the oral cavity and adjacent parts. I myself feel that surgical interference is the only treatment indicated in acute cases. Consequently, the sooner such treatment is instituted, the more effective and satisfactory will be the outcome. Dr. Mead has pointed out why these cases progress much more rapidly than others, this depending on (1) the type and (2) the virulence of the organisms and (3) the physical resistance of the individual. As he has said, we all realize that most staphylococcic infections are localized and that this type of organism has the propensity to encapsulate itself and thus retard invasion; while, on the other hand, the streptococcus does not do this, but swiftly makes an invasion into the surrounding tissues, diffusing into rather an extensive area; a far more active and deadly process resulting than is consistent with the previous type referred to. Because of these facts and, too, the vascularity of the tissues in and about the mouth, together with the corresponding activities of the lymphatics during any inflammatory process, the development of a streptococcic infection is always the more rapid and therefore the cause for tremendous concern for both patient and doctor. Dr. Mead's statement that only a few hours may elapse before the patient becomes dangerously ill is well founded. To illustrate: July 20, 1932, I was called by a dentist to see a girl, aged 12, for whom he had, the day before, extracted a lower right first permanent molar under gas anesthesia. The tooth was actively infected and had been aching for three or four days previous to his entrance on the case, the patient having returned from the seashore to have the tooth removed. In removing the tooth, part of the lingual plate of the socket was disturbed; otherwise, the extraction was normal and curettage was not carried out. The tooth was extracted at 4 o'clock in the afternoon. The next morning, there was a marked area of edema of the external tissues and the floor of the mouth was indurated and swollen, the condition involving the entire right side and extending over to the cuspid on the left. The tissues of the floor of the mouth were on the plane of the occlusal surfaces of the teeth on the side affected. There was a lateral elevation of the tongue, the tip being everted and touching the roof of the mouth. The temperature was 103.5; pulse, 120; respiration, 26. There was considerable pain, restlessness and marked pallor, indicating rapid absorption and a general septic condition. The patient was ordered to the hospital for immediate operation. Incision and drainage was performed at 6 o'clock that evening. Two incisions were made, one just laterad from the medium line and extending down and back and posteriorly as far as the second bicuspid; the other, op-

posite the first molar area, directed down and back a distance of approximately three quarters of an inch. From this area, about 0.5 c.c. of pus was evacuated. From the anterior wound, approximately one half this amount was obtained. The technic was as follows: incision of the superficial tissue; a dissection by the Hilton method (as described by Dr. Mead), and drainage by a rubber dam, the tubes being sutured in position so that they would not be forced out by action of the tissue of the mouth. A 1 per cent hychlorite solution was prescribed as a mouth wash every two hours, and hot magnesium sulphate stupes were applied every hour externally. One twelfth grain of morphine as needed was ordered. The next day, irrigation of the wound was instituted with the 1 per cent hychlorite solution every three hours. Within twenty-four hours, the temperature dropped to 101; pulse, 100; respiration, 20. The second day, the temperature was 99.8; pulse, 80; respiration, 20. On the third day, the temperature was normal, pulse 80 and respiration normal. The irrigations were continued through this period. On the fourth day, the drains were removed. Irrigation was continued for two more days, when the patient was discharged from the hospital. No further treatment was necessary and a good recovery resulted. This case illustrates the wisdom of quick action when a condition of this kind presents itself. There is an old surgical axiom, "Where pus is, there evacuate," which holds as true today as when it was first uttered. Diagnosis of this condition is paramount. Its early recognition presages a successful prognosis; to procrastinate or delay is fatal. I wish to emphasize this point: A delay of twenty-four hours in an acute case of cellulitis may make all the difference between rapid recovery or one prolonged to the exhaustion of the patient and those caring for the case. As the acute cases are spectacular, easily discernible and readily correlated, there seems to be no reason that immediate action for the treatment of a case cannot be had. In this type of case, until the symptoms begin to improve, as indicated primarily by a dropping of the temperature and the pulse rate, one has to be ever vigilant. In cases of sublingual abscess (which may in a few hours become a diffused cellulitis by a breaking down of the capsul or invasion of other bacteria) or of that other type of acute diffused cellulitis known as Ludwig's angina, the surgeon must be armed for any emergency. Aside from the general toxemia which manifests itself in these cases, the gravest danger, and one which must never be lost sight of, is edema of the glottis. When this occurs, there is immediate loss of function and closure of the bronchi, with asphyxiation. If no help is at hand, death may ensue in comparatively few seconds. Therefore, in all these cases, instruments for performing an emergency tracheotomy are kept at the bedside of the patient. Fortunately, these cases are rare. In the few cases that I have treated, it has been my good fortune to be called in during the early stages, which meant that intra-oral incision and drainage was carried out, rather than entrance made into the area extra-orally, with the resultant deep scar in the submaxillary region. I would not hesitate to incise externally should the diffusion be extensive enough to warrant it. In these extreme cases, a scar is a secondary consideration. The postoperative treatment is always that which promotes the natural efforts and functions of the body. The essential is rest—physiologic rest. Dr. Mead makes this the first consideration in his ward routine of cellulitis cases. I insist, in all cases of sepsis, that the patient remain in bed for at least twenty-four hours after the temperature has returned to normal. I then gage my "out-of-bed privileges" by a ratio of twice the number of minutes to the number of days the patient has been in bed, doubling the time each day thereafter. For example, if the patient has been confined ten days, twenty minutes out of bed for the first day, forty for the second, eighty for the third, etc., after the second day dividing the time into two, three or four periods, as the strength of the patient indicates. If the confinement is less than a week, I usually begin with a twenty-minute period the first day, allowing a sixty-minute period the second day and permitting the patient to be out of bed the third day. This program is subject to "change without notice," and delays or advancements are made subject to the patient's reaction to them. I never employ any but normal saline enemas, for the reason that they are more absorptive and are nonirritating to the mucous membrane of the intestinal tract. I never paint the tissue with iodine, because I believe that it is escharotic in its action, or mercurochrome, because its penetration into the tissue is inconsequential, and the same is true of metaphen. I have tried them all and feel that they are a source of irritation to the patient. The patient should be left alone to rest as

much as possible. I believe in simplicity of treatment in these cases. *Rest, rest, rest* and nourishment—that is the key thought for the postoperative treatment of cellulitis. Let nature do the work. It will, if given the chance. My routine is rest, nourishment, the induction of artificial hyperemia by hot applications when necessary and normal saline enemas once a day for reasons already indicated. Strychnine may be used as a tonic, helping the patient to carry the overload from the septic process. Copious draughts of water by mouth and rectum are most beneficial for the detoxification of the blood stream. Alcohol rubs given every four to six hours until the temperature is down to 100 and good nursing are essential. The treatment is both simple and effective.

George W. Christiansen, Detroit, Mich.: It is worth emphasis that we are not trying merely to catalog a particular case as Ludwig's angina or periostitis or lymph adenitis, but are attempting to understand the underlying pathologic and bacteriologic processes in these conditions, that our efforts to lower mortality and morbidity may be logical and scientific. It is more important to know basic facts and to recognize that the clinical terms are properly descriptive of degree rather than clinical entities. Of the many problems arising in the management of cellulitis, the most irksome probably concerns the time to attempt drainage. Dr. Mead tells us that some cases reach this stage in twenty-four hours, while others do not for ten days. Experience is, of course, one of the greatest aids in this problem, but important information is to be gained from careful observation of the temperature range and a frequent white-cell count. Thus, while surgery is usually contraindicated in the presence of an unchanging high temperature or a blood picture showing little or no increase in leukocytes but with an abnormally high polymorphonuclear count, a decision to look for pus may follow a sudden drop in temperature or the development of a typical leukocytosis. There is a wide variation in opinion regarding the nature of the causative organism. Hans Zinsser says that *Streptococcus hemolyticus* is the cause of Ludwig's angina. C. N. Dowd, in a report of more than fifty cases of cellulitis, found the streptococcus predominating. Welsh, of Johns Hopkins University, says that all of the affections caused by one species of pyogenic cocci may be caused by any of the others; that, for example, "the staphylococcus may produce cellulitis as well as the streptococcus pyogenes." Most authorities agree on one fact, that staphylococcic infections are as severe as streptococcic and hence finding the former does not increase the patient's safety nor point to an earlier, more favorable result. I wish to cite a case which terminated in a staphylococcic blood stream infection. Mrs. K. aged 35, had the two lower left bicuspids devitalized in December. Two weeks later, they became extremely tender to pressure and, simultaneously, a sublingual adenitis developed, as well as a decided edema of the lower lip. Within a few days, these teeth became loose and there was a purulent discharge at the cervical margin. The patient appeared toxic and weak but the temperature was normal. After a careful analysis of the conditions, the teeth were removed under general anesthesia. Their attachment had been destroyed, and, literally, only finger pressure was necessary to accomplish this. The subnormal condition of the patient was emphasized by the anesthesia. She was asleep after a very few inhalations and recovery was slow. The following day, her strength seemingly had returned and she was back at work in a store at her home. The enlargement of the lower lip had disappeared and she was apparently much improved. The next morning, I was called to her bedside. The entire picture had changed, the patient presenting every sign of a severe generalized infection. She was restless, stuporous and slightly irrational. The temperature was 106 F., pulse, 120 and respiration rate, 34. She was hospitalized within an hour and died the following day. Pus from the mouth and the blood culture both showed staphylococci. At the time of death, the cervical tissue from the clavicular regions to the symphysis was edematous and hard, and fixation of the mandible was almost absolute. The only conclusion to be drawn is that the patient was simply overwhelmed by the virility of the organism, but why the change was so rapid is a mystery. Neither may we enjoy a sense of security in a so-called chronic cellulitis. In June, Mr. H., aged 25, had a right upper third molar removed under local anesthesia obtained from a tuberosity and palatal injection. Swelling thereupon developed in the right temporal fossa, apparently under the deep fascia. There was mild trismus. The situation continued for about four weeks. By now, the patient and his family were becoming anxious and I saw the case in consulta-

tion. The trismus had a bad effect mentally and had made eating difficult. The patient was losing weight. There was a slight increase in pain from attempted mastication and the temperature remained around 100 F. The tissues in the temporal fossa were elevated, giving the head a distinct unilateral prominence, and were very hard and unyielding. I suggested rest in bed, general supportive treatment with sedatives and the use of an ice bag, if tolerated, continuously for twenty-four hours. In three days, the temperature was normal, the swelling had decreased and the patient was able to come to the office. Within twenty-four hours, diarrhea and vomiting developed. The patient complained of pain in the back of the neck and he became slightly irrational. The temperature had risen to 103.5 F. and the pulse was over 100. He was hospitalized and, because of his restlessness, required restraint. A spinal puncture and blood culture were made. The next day, the hard swollen mass seemed to be breaking down. A needle on a 10-c.c. Luer syringe was introduced and pus was found subperiosteally under enough pressure to raise the barrel of the syringe. An incision 3 cm. long was made and was extended through the tissues to the temporal bone. Drainage yielded in copious quantity a dark brown purulent material with a very foul gaseous odor. Symptoms of meningitis increased and death occurred the following day. The blood culture remained negative, but the spinal fluid and pus from the incision both showed streptococci. Hydrotherapy is of great value in the treatment of cellulitis. Hot moist dressings are soothing and helpful where necessary, but in the presence of tense tissues and extreme pain with high temperature, they are very distressing. In such cases, cold compresses actually accomplish much locally and they make the patient more comfortable. In the matter of drainage, we must remember that the point of incision is of great importance. The tissues must be opened at a point whose location permits a thorough search for pus. It is well to remember that a midline incision permits access to the fascial planes, being, I believe, much more efficacious than gravity drainage. I should like to ask Dr. Mead if he uses foreign proteins to hasten localization through leukocytosis, and in what percentage of cases he finds a coexisting peritonsillar abscess. What, in general, besides clinical experience guides him as to when to attempt drainage? What contraindications does he respect in roentgen-ray therapy? The use of this in the presence of a high temperature and a red shiny greatly swollen area does not seem good practice. Regardless of its undeniable beneficial qualities in many cases, the use of the roentgen rays must not cause us to overlook proven cardinal principles for the evacuation of pus.

Dr. Sterling: I have had no experience with foreign proteins. In my experience, a coexisting peritonsillar abscess occurs in 1 per cent or fewer of these cases. While surgical judgment, in these cases, based upon clinical experience, is the most important factor in determining when to make the incision, the temperature, the blood picture and the physical condition of the patient are all intimately involved. When there is definite assurance of pus formation, roentgen-ray therapy is usually impracticable and incision is of more importance. I think the danger would be in relying too much on the value of roentgenotherapy when incision is indicated.

PRECISION CASTING UTILIZING THE HYGROSCOPIC ACTION OF PLASTER IN INVESTMENT IN MAKING EXPANDED MOLDS*

By C. H. SCHEU, D.D.S., Cleveland, Ohio

AN attempt to solve any scientific problem will always be made in the manner which seems to promise most from the facts established. If the work is done in a scientific manner, similar experiences the world over will lead to the same or nearly the same conclusions.

In a review of the literature on inlay casting, it will be noted that advancement has been made slowly. I wish to express gratitude to the many workers who have unselfishly contributed the findings which I will necessarily have to quote, explain or interpret in the light of my own experience.

The work done at the National Bureau of Standards under the Research Commission of the American Dental Association afforded accurate information regarding the physical properties of the materials we are using, indicating that to reproduce a wax pattern accurately in gold, an expanded mold must be made by utilizing the setting and thermal expansion of investments and some thermal expansion of the wax pattern.

Studies made on wax patterns showed that distortion other than expansion occurs when thermal expansion of the wax is attempted. From the literature on this subject, the consensus of opinion seems to be that wax expansion is unreliable and dangerous and, if applied at all, only the minimum required amount should be used.

This shows the desirability of having all the required expansion take place in the investment. To obtain sufficient thermal expansion in an investment to compensate for the shrinkage of gold was possible in only one investment; namely, cristobalite. Cristobalite investment compound, when heated, becomes very friable. The large and rapid thermal expansion of the cristobalite and the contraction of the plaster binder causes a poor union of the fine particles of investment. This makes cristobalite investment compound unsuitable for large castings and increases the danger of having defects in small castings.

I wish to present fundamental facts a knowledge of which is necessary to understand thoroughly and to produce consistently precision castings by utilizing the hygroscopic action of plaster in investments in making expanded molds. I shall discuss the experiments that led to the development of this technic and I hope to show that the accuracy of molds made in this manner can be controlled to a higher degree than we could hope to attain by thermal expansion of either the wax pattern or the investment.

It is an established fact that a better quality of concrete is obtained if mois-

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ture is supplied after the initial set has taken place. Many dental operators believe that the same is true with stone models. George H. Wilson, in his textbook, "Manual of Prosthetic Dentistry," showed that certain plasters expand up to 0.0044 inch to the inch by taking up moisture from the air. With this information at hand, some commercial investments were tested to determine what results the addition of moisture would have on them.

In these experiments, a mix of investment was placed in a rectangular mold formed with precision gage blocks on a glass slab. (Fig. 1.) After the initial set had taken place, the investment with the gage block mold was immersed in water and the results were noted. The following results were obtained.

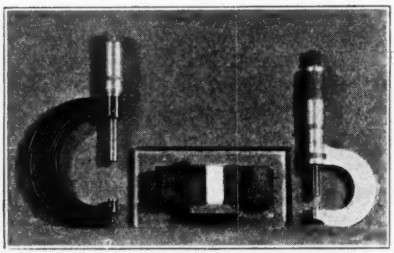


Fig. 1.—Investment between gage blocks on glass slab and micrometers used in measuring expansion.

All of the casting investments that were tested expanded. Each investment had a definite amount of expansion when mixed with the same powder: water ratio and manipulated in the same manner. It was noted that the expanding property deteriorated very rapidly if the investment was exposed to air.

Investments showed the following characteristics with the different methods of manipulation:

The thicker the mix, the greater the expansion. A mix made with warm water expanded more than one made with cold water. The fact that the mix had cooled before it was placed between the blocks did not seem to affect the expansion. This was probably due to the fact that plaster is most soluble in water the temperature of which is from 95 to 105 F.

The time at which the mix is placed in the water is of utmost importance. It was found that if the mix was placed in the water early, it would not expand so much as when placed in a little later. It was also found that if the mix was placed in the water after a certain time, it would not expand to the amount the mix was capable of expanding. This phenomenon affords a simple accurate method to control the amount of expansion for a given mix.

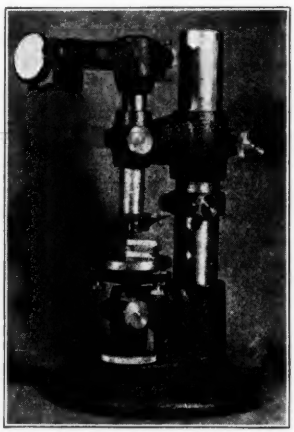


Fig. 2.—Zeiss optimeter used in measuring wax patterns and gold castings.

The temperature of the water in which the mix is placed is important for two reasons: 1. The temperature of the water slightly controls the expansion of the investment. 2. Water at a tempera-

ture of 100 F. slightly softens the wax pattern so that the fine margins in the investment are not marred while expansion is taking place.

In determining the amount of expansion, the method and the amount of mixing is as important as the materials used. It was found that mechanical spatulation retards setting and reduces the hygroscopic expansion of investments. When a combination of mechanical spatulation and vibration was used for one minute, the set in a given investment was retarded twelve minutes over a similar mix with one minute hand spatulation and the expansion was reduced from 2.2 to 0.8 per cent. One minute hand spatulation was adopted, the air being well beaten out of the mix by pounding against a solid object.

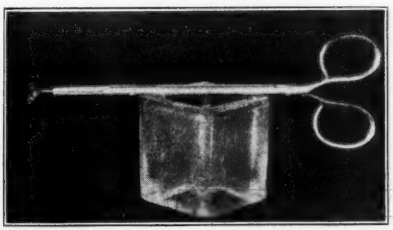


Fig. 3.—Wax pattern mounted on sprue former and held with surgical needle holder.

The mix should remain in the water at least twenty minutes to obtain the full expansion. It should not remain longer than thirty minutes as no appreciable expansion is obtained after twenty minutes and investment begins to break down when allowed to remain in the water a longer period.

When heated, investments expanded by this method show the general characteristics of investments handled in the usual manner. First, there is an expansion of about 0.2 per cent, at a temperature of from 200 to 250 F. Then there is a gradual shrinkage to the original expanded size at 600 F. At between 600 and 800 F., there may be a contraction of 0.1 per cent of the expanded size. After 800 F. is reached, expansion again takes place. These figures depend on the investments used and also on the powder: water ratio employed in making the mix. All of the investments showed shrinkage on cooling.

The same mix gave the same expansion every time, to within 0.1 per cent. The percentage change is given in linear measurement.

Investments expanded in this manner were more porous and permitted the air to pass out of the mold more readily.

Fig. 4.—Thick mix applied to wax pattern by combination of vibration and brushing.

The strength of an investment expanded in this manner is slightly reduced as compared to that of one made from a similar mix not expanded. This is not a bad feature as a very stiff mix of investment is used and the mold is in reality stronger than one made with the usual mix.

These experiments gave some gratifying results. It was found that R & R green investment could be made to expand 2.2 per cent; Kerr precision, 1.5 per cent, and R & R gray, pyro-mold

No. 1 and 2 and Coe universal, from 1 to 1.2 per cent.

With the wide range of definite expansion available and on which definite control can be had by placing some of the mix between gage blocks, the following is apparent:

The investment must be applied to a wax pattern in such a way that the expansion is not influenced by a ring. The proper expansion must be selected. As sufficient expansion can be obtained by thin as well as thick mixes, which is the right mix to use?

It was found that if a 1.6 per cent expansion was used, and castings similar to a full crown on a steel die, a casting for a mesioclusodistal steel die and a one-quarter inch measured wax pattern

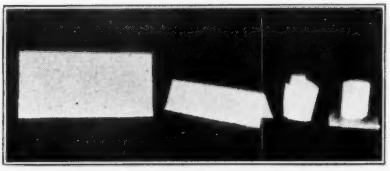


Fig. 5.—Steps in construction of wax paper ring.

were cast, all were reproduced accurately. On the measured one-quarter inch wax pattern, the accuracy was to within 0.0002 inch. When a thin mix was used that gave a 1.6 per cent expansion none of the castings were accurate. These castings were made with an inlay gold.

In foundry practice, the pattern maker allows one-eighth inch to the foot for shrinkage in cast iron regardless of size and shape of the casting. Since we are duplicating the size of the wax pattern in gold, it would seem that, if our technic is correct, the same method for the same gold should afford an accurate casting regardless of its size and shape. The foregoing experiments substantiate this statement.

Experimental work to determine why a thick mix gave so much better results than a thin mix of equal expansion gave the following findings: Thin mixes of commercial and experimental investments expanded to 1.6 per cent by immersion in water shrank in size in a temperature of from 600 to 800 F. The porosity of the mold was greatly increased, thereby reducing the resistance to compression.

These findings are nicely demonstrated in one of the older technics. We used to paint a wax pattern with a thin mix of investment and pour the balance of investment over the pattern. We now know that these investments would shrink

Fig. 6.—Covered wax pattern vibrated into investments in wax paper ring.

during the burning out process. We would also allow the investment to cool before casting, causing more shrinkage. Those who use this technic will remember that one or two surface inlays fit very well, but it was a different story with a three surface inlay. I cast a measured one-quarter inch wax pattern by this obviously faulty technic and my finished casting was 0.0004 inch too large.

Alden J. Bush and Frank C. Starr have shown by experiment that investments can be compressed by pressure without fracturing. When the invested pattern was heated, the wax expanded in

all directions, causing pressure until it was soft enough that the flow from the sprue hole balanced the internal pressure. This in simple inlays made larger molds and compensated to a certain extent the shrinkage of gold. In the three surface inlays, this method compressed the core and these castings would not go to place. This led to the making of a thick mix for the core in investing patterns of this type. This core would set first and would expand by its normal setting expansion and by taking up moisture from the thin outer mix. This expansion was never mentioned. In many cases, this method gave good results, and one still sees it or similar technics demonstrated at clinic meetings. It is surprising to note the many fine inlays that have been made as a result of an accumulation of errors in our favor.

Compare this to a mold made with a 1.6 per cent expansion from thick mix; All the expansion is obtained as a setting expansion which takes place in all directions uniformly. When the mold is completed, the wax lies loosely in the mold. When it is heated to eliminate the wax, the latter will be soft enough to flow from the sprue before it has expanded enough to exert pressure in the mold. In this way, no compression of the mold can take place from the wax.

If the mold is not heated to over 600 F., and is cast at the most unfavorable temperature, there is not more than 0.2 per cent expansion. If heated to a temperature of not over 800 F., and cast at the most unfavorable temperature, the contraction would not be more than 0.2 per cent. These small errors could not be detected in an average inlay. The wide range at the comparatively low temperatures at which the mold is the proper size and the small danger from cooling while casting afford a marked advantage over the high heat method.

The mold so made permits the flow of air from the mold more readily and the finest marks and margins are accurately reproduced. The thick mix resists compression while casting.

With these data, degrees of expansion were developed for the different kinds of golds, from thick mixes. From work done at the Bureau of Standards in casting rods which were 3¼ inches long and approximately one-eighth inch in diameter, the shrinkage of gold was determined to be 1.25 per cent. In castings of this type, little difference in shrinkage was noted for the different golds. When I made a casting with an inlay gold for a mesioclusodistal steel die, it would not go to a place when 1.25 per cent expansion was used. When the same expansion was used and a gold used that was intended for partial denture work, the castings fitted accurately. This experiment indicated a variation in shrinkage in different gold alloys. I would explain the 1.25 per cent shrinkage obtained in casting 3¼ inch rods by cooling of the ends and the fact that more gold was fed into the casting.

To determine shrinkage of gold in a manner comparable to that employed in our inlay work, one-quarter inch measured wax patterns were used. These wax patterns were measured with a Zeiss optimeter and were accurate to within 0.00005 inch. (Fig. 2.) A control was used with each setting to assure that the expansion of the investment was absolutely what it had been determined to be. By this method, the shrinkage for the different golds tested was very nearly identical to the maximum expansion obtained by the Bureau of Standards in gold when heated from room temperature to the highest temperature at which it remained rigid.

An interesting finding in casting these measured wax blocks was that if the sprue

was attached to one end, the casting always showed a taper. The large end was always away from the sprue. The taper was only from 0.0002 to 0.0004 inch, but was easily measured and found constant with the Zeiss optimeter. This also shows the effect of gold feeding into the mold and that the greatest accuracy is obtained when the sprue is placed in the center of the casting.

The present information indicates that light colored 22-carat gold shrinks very much, probably the most of all dental golds. This gold shrinks more than 24-carat gold. Dark 22-carat and many inlay golds give average shrinkage, which was found to be from 1.5 per cent to 1.6 per cent. Hard golds with lowered melting points and lowered spheroidal tendencies shrink the least. This shrinkage was found to be from 1.2 to 1.4 per cent.

We should use golds with lowered spheroidal tendencies. A 24-carat gold button will be spherical in shape when 20 pounds pressure has been applied in casting. This tendency outside the mold must also be present inside the mold, and it is reasonable to assume that it must have some influence on the casting.

More research work must be done along this line, and the manufacturers of gold alloys will have to supply accurate information as to their products.

With these data, a table and casting technic were developed whereby the size of the mold is in the hands of the operator. As R & R green investment and Kerr precision investment seemed to be the most favorable of the commercial investments tested, the technic was developed for these investments. Three cans of each investment were used in developing the table for the required degrees of expansion.

Use of the following mixes is recommended to obtain the expansion needed. The figures given will vary slightly with different cans of the same investment. The investment must be stirred well or there will be a variation in one can of investment. The water used will also cause variation in the expansion and the setting time. In some localities, the use of distilled water may be necessary.

The expansions obtained from R & R green investment, 10 gm. with 3 gm. room temperature water, follow.

Mixing is done with a heavy hand spatula and the air beaten out of the mix by pounding against a solid object. Spatulation and pounding are repeated. This should take one minute.

The variation in expansion is obtained after the investment is applied to the wax pattern. After the initial set has taken place, the covered wax pattern is immersed in water at a temperature of 100 F. This causes the investment to expand. The amount of expansion is regulated by the length of the time the covered wax pattern is allowed to set before immersion in water. The time is figured from the time the water is poured over the investment.

For an expansion of 1.6 per cent, we immerse after ten minutes in water at 100 F.; 1.5 per cent, after eleven minutes; 1.4 per cent, after twelve minutes, and 1.3 per cent, after fifteen minutes. The investment should remain in the water at least twenty minutes and not more than thirty.

Expansions obtained from Kerr precision investment, 10 gm. and 3.4 gm. room temperature water, with the same technic as for R & R green investment, were as follows: For 1.5 per cent, it is immersed after ten minutes in water at 100 F.; 1.4 per cent, after ten and one-half minutes; 1.3 per cent, after 11 minutes, and 1.2 per cent, after eleven and one-half minutes.

The investment should remain in the

water at least twenty minutes and not more than thirty.

The technic for investing the wax pattern is as follows: The wax pattern is mounted on a sprue former and held with a surgical needle holder. (Fig. 3.) The wax pattern is next thoroughly cleaned. From the percentage quoted, the desired expansion is selected. The investment and water are weighed as indicated. The resultant mix will be quite stiff and will be difficult to work on the pattern. To overcome this, a little investment is placed in a dappen dish and a thin mix is made. The latter is painted on the pattern with a sable brush and allowed to stand while the regular mix is made. The regular mix is made as indicated in the table, with the fact that the mixing is as important as the materials used in mind. The thin mix is now blown off the wax pattern and the regular mix is easily applied to the pattern by one of the following methods:

1. The hand holding the wax pattern with the surgical needle holder is placed on a mechanical vibrator; the investment is applied with a stiff sable brush, and the combination of vibration and brushing flows the investment over the wax pattern. (Fig. 4.)

2. The investment is vibrated to place with a serrated instrument.

3. The investment may be worked to place with a stiff sable brush. The pattern is given a covering of investment of one-eighth inch or more and allowed to set the required time, as indicated in the table. In large inlays, difficulty may be experienced in that the investment may sag after it is applied to the pattern. This is overcome by making a ring out of wax paper capable of expanding. (Fig. 5.) A piece of wax paper approximately 2 by 3 inches is folded in the middle lengthwise, and a ring is made by placing the one folded end between the folds of the other end. A floor is made for the wax paper ring with soft wax, the ring is filled with the investment and the covered pattern is vibrated into the ring with a vibrator attached to the lathe or other mechanical vibrator. (Fig. 6.)

The paper ring and wax floor are removed as soon as the investment has set sufficiently to permit of handling.

After the covered pattern has set the required time, it is placed in a dish of water the temperature of which is 100 F. The warm water in which the covered pattern is immersed not only causes the required expansion, but also slightly softens the wax pattern, so that the fine margins in the investment are not marred. The investment is permitted to remain in the water at least twenty minutes and not more than thirty.

The covered pattern is now invested in an inlay ring with an investment that has little setting or thermal expansion. Any of the high silica casting investments are satisfactory as the wax is eliminated at a temperature of less than 600 F. There is, in most investments, little thermal expansion under 600 F.

The burning out is done on an electric hotplate. I use a Universal, made by Landers, Frary & Clark. Shortly after the investment has quit smoking, it is ready to cast. If a hotplate of this type is used, an extra hour of burning out would not affect the case.

Casting is done with any good casting machine.

Realizing that I had not explained why investments expand when immersed in water and that the exact composition of the material recommended was not known to me, I introduced the essentials of this technic to the profession in a clinic to the W. D. Miller Study Club, of Cleveland, Ohio, Oct. 27, 1931.[1]

1. Scheu, C. H.: New Precision Casting Technic, J.A.D.A., 19:630 (April) 1932.

Results obtained by members of the profession in testing investments for expansion and in making castings by this method were varied. Why these variable results were obtained will be discussed, with an explanation as to how to eliminate the difficulties which have developed.

The equipment generally used for testing setting expansion of investments is the measuring microscope. The investment is poured in a trough and markers with hair lines are placed in the investment. The change in length is measured by the microscope. When the effect on investments of immersion in water was tested by this method, there was considerable difference in the results from those obtained by the gage block method. One might lay some difference to the mixing of the investment; on the time of immersion, or on the temperature of the water bath. There is a difference that cannot be explained by the personal equation of the operator. It has been my experience that an investment which shows an expansion of 1.5 per cent with the microscope will show more than 2 per cent expansion by the block method. Experienced operators with the microscope have noted that different degrees of expansion are obtained in long and short specimens of investment. They have also noted that different results are obtained when the trough is lined with wax paper and still another result when the trough is lined with a number of small pieces of wax paper overlapping each other. Results such as these lead me to believe that friction must influence the amount of expansion. Since results obtained by the block method are 0.5 per cent or more greater than results obtained by the microscopic method, and since the observational error could not be greater than 0.05 per cent by the block method, it would seem that the final results obtained by the block method are more nearly accurate.

The difficulties experienced in making castings by this method were improper expansion, surface roughness, or a combination of the two.

Factors in expansion have been thoroughly discussed in this paper and will be mentioned later in the discussion of investments.

Conditions that affect the surfaces of castings may be grouped as those common to all casting technics and those that are associated only with this technic. The technic here described outlines a method for mixing the investments, tells how to apply the investment on the wax pattern and recommends elimination at a temperature not over 600 F. These procedures with any suitable investment will produce castings that are exceedingly smooth when no expansion of the mold by immersion in water has been attempted.

If castings made from molds that were expanded do not present these same smooth surfaces, any roughness must be attributed to immersion in water. This roughness is caused by a slight disintegration of the investment due to immersion in water before the investment has sufficiently set. This was experienced in carefully following the technic because the initial setting time of different cans of the same investment varied from five to eighteen minutes. If an investment requiring eighteen minutes for an initial set is applied to a wax pattern and the covered wax pattern is immersed in water in ten minutes, the investment will wash off. Soluble modifiers may also be dissolved out of investment by immersion in water, a change on the surface of the mold resulting. These difficulties will be eliminated by investments standardized for this technic.

Castings made from expanded molds with investments designed for this tech-

nic have the same smooth finish as those made from the nonexpanded molds if the investment is sufficiently set at the time of immersion.

It is evident that much of the success or failure of this technic depends on the investment. Experience proved that the commercial investments capable of expanding enough for this technic were not entirely satisfactory. R & R green investment gave the greatest expansion and the amount of expansion was easily controlled, but the surface of the castings was inclined to be rough. Kerr precision investment gave castings with better surfaces, but expansion was hard to control and, in many cans of this investment, expansion was insufficient. As smooth castings seem to be associated with high plaster investments, equal parts of R & R green investment and Kerr No. 1 investment were mixed. Castings made when this mixture was used had very smooth surfaces and the expansion of the mixture was as great as R & R green investment, but the amount of expansion was hard to control.

Studies were made to determine the conditions that cause and control the expansion of investment when handled in this manner, those that affect the uniformity and stability of investment and those that influence the surface of the castings.

Work done at the Bureau of Standards showed that investments consist chiefly of plaster of Paris and silica with small quantities of other materials added as modifiers. In examining dental and research literature on gypsum products one finds that many substances have been used as modifiers for plaster of Paris. The action of many of these materials was tested. When the chemical and physical properties of plaster are understood, one can readily see what the result will be when certain materials are added.

Samples of plaster of Paris were obtained which were free from modifiers. Stiff mixes made from these plasters when immersed in water would expand from 0.6 per cent to 0.9 per cent. When these plasters were mixed with silica in proportions found in the high heat investments, the expansion obtained was greatly increased. It was found that the fineness of the silica and the amount and kind of plaster determined in large measure the expansion available. The maximum expansion obtained by plaster and silica was 3.6 per cent.

Modifiers added to plaster and silica in making investments affect the setting time, the expansion, the porosity, the crushing strength and the heat resisting qualities. These changes may take place in the investment before it is used, during mixing and setting and in the burning out process.

Plaster of Paris is an unstable compound and will take up moisture from any source to form gypsum. Gypsum, when added to plaster of Paris, acts as an accelerator. Should any material having deliquescent or efflorescent properties be added to investment, the properties of the investment are constantly changing owing to the formation of the gypsum and a reduction of the plaster content. It is interesting to note that most of the modifiers used in investment have one of these properties. They are responsible for the change in setting time, in expansion and in strength.

Normal setting expansion in investment seems to be associated with the hygroscopic properties of plaster and by the formation of gases caused by a chemical reaction. Gases are formed by the action of acid or acid salt on magnesium carbonate, normally found in plaster, or by the addition of salts that produce a reaction. In this manner, it has been possible to produce a setting expansion of

0.8 per cent without immersion in water. Investments of this kind are porous and there is great danger of small nodules appearing on the surfaces of the castings.

Porosity of investment is necessary. The amount of water added in mixing and taken up by immersion, as well as modifiers, affects the porosity. Increased porosity reduces strength and causes contraction at temperatures of from 600 to 800 F. For the best results, only the minimum required porosity should be used.

Boric acid is a modifier found in investments. The action of boric acid is readily understood if the changes taking place when it is heated are understood. When heated to 212 F., boric acid loses water, forming metaboric acid, which slowly volatilizes at that temperature. Heated to 320 F., it fuses to a glassy mass of tetraboric acid. At higher temperatures, the fused mass swells up, loses all of its water and becomes boron trioxide. Boric acid increases the crushing strength of investment and increases the thermal expansion, but may also cause rough surfaces on castings.

Experimental investments compounded to determine to what extent the difficulties encountered could be eliminated proved to be so satisfactory that error is for all practical purposes eliminated.

It was possible to produce an investment that will not change its physical properties within a year if protected from moisture and air. This period may be a great deal longer, but there has not been sufficient time to determine this.

The investment, when mixed as recommended, will set in from six to seven minutes and is immersed in water after fourteen minutes, giving a safety factor of at least six minutes to become sufficiently set. A slight error in the weighing of the materials does not affect the expansion of this investment when immersed in water after fourteen minutes. This is due to the change in setting time of the different mixes, the consequent shifting of the time where maximum expansion is obtained, and the change in the amount of expansion available. In this manner, it was possible to balance an investment to give a 1.6 per cent expansion that was not entirely dependent on the powder: water ratio.

When heated, this investment expanded 0.2 per cent at from 200 to 250 F., gradually returning to its original expanded size at a temperature of 600 F., and remaining this size to 800 F. At no time does it contract under the expanded size. After 800 F., this investment will expand but show no signs of shrinkage or cracking under 1800 F.

Porosity in this investment is sufficient for all ordinary dental castings. Full crown castings on steel dies should be vented, but this is not necessary for average size crowns on teeth.

The surface finish of castings made with this investment is exceedingly smooth.

The material is practically "foolproof" and does not require the purchase of expensive equipment to produce accurate smooth castings.

Some of the statements made in this paper are radically different from those at present accepted and in use. I presented the facts as obtained in experimental work of two years' duration. All measurements were made with instruments that are accepted as standard wherever fine measurements are required.

SUMMARY

1. Hygroscopic expansion of investment affords a method for making expanded casting molds the size of which is in the hands of the operator.

2. Molds made in this manner are not

distorted from pressure exerted by the wax pattern when heated.

3. There is less than 0.2 per cent change in the mold during the burning out process.

4. The accuracy of the mold can be controlled to such a degree that the difference in shrinkage of different gold alloys is demonstrated.

5. The surface finish of the castings is exceedingly smooth.

6. Hygroscopic expansion is easily adapted to expanded models for larger castings.

Hygroscopic expansion of investment gives the average dentist a new standard for casting work, which, up to now, has been attempted only by a few expert technicians.

A SIMPLIFIED IMPRESSION TECHNIC THAT PRODUCES THE MAXIMUM DEGREE OF DENTURE BASE ADAPTATION AND RETENTION

By RUPERT E. HALL, D.D.S., Chicago, Ill.

FOR a long time, we have recognized that our difficulty in securing impressions is a lack of ability to confine the impression material under pressure for the purpose of compressing the soft tissues, particularly the peripheral tissues (shown at *A A* in the accompanying illustration). To employ the usual procedure in securing an impression is like trying to adapt wax for an inlay pattern or amalgam for a filling without a confining matrix—the impression material escapes from the tray and flows away from the periphery, releasing the pressure on the material and precluding any possibility of compressing the tissues, adaptation being secured only of the hard areas that are disposed at right angles to the direction of pressure exerted in carrying the tray to place (*D D*). The late Dr. Green, author of the correctable compound impression technic, pointed out this fact and stated that the impression of the hard palate was about the only part of the impression that was good and that we proceed to relieve this area, destroying the adaptation of the only part that is satisfactory. With his correctable compound technic, he did much to improve impression taking.

Relief, then, appears to be necessary to prevent undue pressure on the hard areas because of failure to secure compression of the softer areas. In other words, it seems that relief would be unnecessary if the softer areas could be made to resist displacement equal to that of the harder areas. Therefore, it does not seem difficult to visualize a form of denture base adaptation different and superior to that to which we are accustomed, if we could but compress the softer tissues to a degree sufficiently extensive to make them resist the load of mastication as well as do the hard tissues. Such an adaptation would require no relief for the harder areas except to allow for future settlement of the denture. The full value of

cohesion, adhesion and atmospheric pressure would be realized under such conditions.

The majority of denture bases made from muscle trimmed impressions are retained principally by partial vacuum and not because of adaptation. That this statement will be questioned at first, I feel certain, but trial of the method of impression taking to be discussed will convince others that it is true, just as it did me.

Securing the maximum degree of adaptation and retention is a matter of uniformly compressing the soft tissues under relatively high pressure (high pressure as compared with that used in the past).

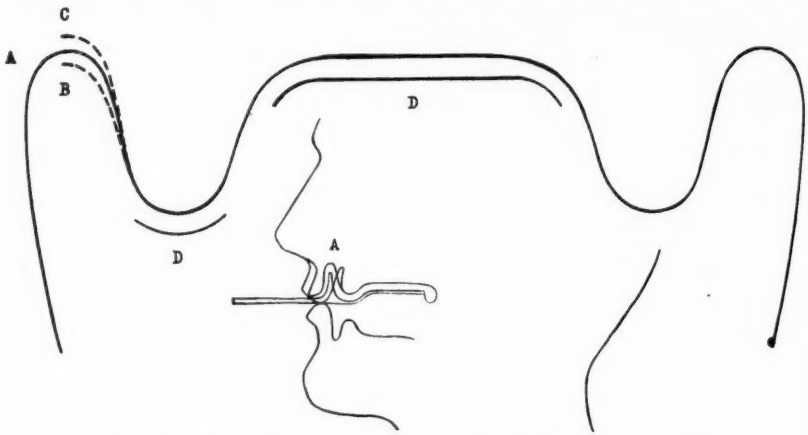
The usual impression fails to compress the soft tissues, and the impression material does not offer sufficient resistance to displacement to prevent distension (drawing away from the jaw) of the peripheral tissues occurring because of displacement of the cheeks and lip, due to the excess of the impression material used (*B*).

In order to secure the maximum degree of adaptation, the peripheral tissues must not only be prevented from being distended (as shown at *B*), but they must be compressed (as shown at *C*), the reverse result to that ordinarily secured.

Such a result can be secured only by confining a low resistance impression material under pressure or by using a material which, because of its high resistance to displacement, does not require absolute confinement.

Confinement of a low resistance impression material is not practicable, because, in the case of an impression of an edentulous jaw, we cannot absolutely confine the material under pressure. It follows, then, that our only hope for accomplishing the desired end is through the use of a material so highly resistive to displacement that it will not only prevent distension of the tissues but will also compress them.

Upon the basis of this deduction, all cases come under the same heading, and the impression technic best for one case is best for all cases, this amounting, in short, from a theoretical viewpoint, to standardization in impression taking. This being the case, an axiom may be stated as fol-



Diagrammatic anteroposterior and cross sections of edentulous upper jaw.

lows: The more resistance offered by the impression material, the greater the compression of the tissues, and the greater the degree of the compression of the tissues, the greater the degree of adaptation of the baseplate and retention of the denture.

In our search for an impression material for carrying out the foregoing principles, we find but one material that has the desired physical properties, i. e., a material that offers high resistance to displacement and one that will not flow after being displaced. This material is plaster of Paris. Modeling compound cannot comply because it will not sustain even its own weight without changing its shape, when heated *en masse* to the temperature required to render it sufficiently yieldable for use in taking an impression.

Experience has shown that plaster mixed to the stiffest consistency possible with the hands is not so resistive to displacement, but that it can be displaced by the edentulous jaw without pain or injury to the patient and with the pressure that it is possible for the operator to apply.

TECHNIC

A regular metal impression tray is adapted, about one-fourth inch being allowed between the periphery of the tray and the jaw. A large well-adapted tray is essential.

THE IMPRESSION MATERIAL

1. To a given amount of United States Gypsum Company's regular set dental plaster (using a retarding agent, such as borax), there is added only sufficient water to enable the operator to collect the plaster into a ball. Whereupon, it is passed to the palms of the hands and kneaded vigorously and rapidly, until a stiff plastic mass is formed, after which it is conformed to the impression tray and the impression secured, a waving or vibrating motion being employed to aid in displacing the plaster, all in rapid succession, in order not to impose too great a hardship on the patient or too great a strain on the operator. Plaster so manipulated produces a mass as highly resistive as the patient can stand and the operator can handle, and which, in turn, compresses the tissues to the maximum, but not sufficiently to injure them or to cause undue atrophy.

2. The plaster is mixed in the regular way, the operator using, instead of a retarding agent, an accelerating agent such as potassium sulphate (one-eighth ounce to 8 ounces of water) (1½ ounces of solution to 3 ounces of plaster).

When the plaster has partially set, attaining a flowing resistance comparable with the stiff mix, it is inserted and the impression secured. I prefer and recommend the second method.

In the case of undercuts not permitting the withdrawal of the impression *en masse,* it must be removed while the plaster is soft enough to break away at such points. The broken pieces are then replaced.

The water syringe is used as an aid in removal of the impression from the mouth.

The excess plaster of the periphery of the impression is trimmed away, the peripheral line for the finished denture being thus established. Wax (pure paraffin wax) is added, and the impression immersed in warm water and postdammed by returning the impression to the mouth as in other impressions.

Hard palate areas are relieved as in other impressions, either by scraping or relieving on the cast.

The method for postdamming employed by the late Dr. George H. Wilson, is also recommended, and impresses me at this time as being preferable. This method consists of adapting beeswax to the posterior border of the impression tray

(both upper and lower) and making it conform to the tissues, after which the plaster is applied to the tray and the impression secured as before described, the wax postdam being carried to place slightly in advance of the front of the tray. This method, as stated, seems to be the better of the two and is simpler and quicker.

Because of the excessive amount of plaster used, it is essential that the impression be poured as soon as possible to prevent the distortion that follows if it is allowed to dry completely.

Aluminum bronze paint, the kind that can be bought any place, has been found to be a very satisfactory separating medium. It will adhere to the wet plaster. When the bronze has dried, the impression is soaked and poured.

Observation of an occasional denture presenting unusual retention (better than I could establish), made from "old time" plaster impressions by dentists not professing to be, or posing as, denture men eventually commanded sufficient attention to lead me to investigate plaster and to evolve the "high pressure" method of impression taking described.

Questioning the wearers of these unusual fitting dentures as to how the dentist took the impression brought the answer: "With a big tray full of plaster." Experimentation has shown that the plaster must have been "stiff." Therefore, my interpretation of the results observed is that the dentist may or may not have intentionally employed "stiff" plaster, but rather had it "stiff" unintentionally, securing the result not through design but accidentally.

It has been a great satisfaction to learn of the virtue of "stiff plaster," for it produces results far superior to any I have ever before experienced. It produces "adaptation" fits and not "suction" (vacuum) fits. Two years' trial of it furnishes the basis for this opinion.

ADAPTATION OF DENTAL AMALGAMS*

By RAYMOND P. LeROY, Ph.C., D.M.D., Portland, Ore.

IN carrying out the experimentation reported, I received valuable assistance from members of a local study club, and many individual dentists throughout the city who prepared specimens to be tested in various ways. Such cooperation enabled me to cover a wide range of operative technic and dental alloys. This material, supplemented by the work done by B. F. Plummer and me, constitutes the basis for my essay.

I wish to apologize for not having much to offer in the way of new data on the subject. As a matter of fact, I have never encountered more elusive, perplexing and vexatious problems than those which emerged from our experimentation with dental amalgams. Many features of the work defied precedent to such an extent that the results obtained by repeated experiment precluded the possibility of drawing definite conclu-

*Read before the General Dentistry Section at the Third Triennial Session of the Pacific Coast Dental Conference, Seattle, Wash., July 6, 1932.

sions. I therefore have found it difficult to write a convincing paper and still adhere to the actual facts. This difficulty assumed even greater proportions when I attempted to select a title for my paper that would be brief, yet sufficiently inclusive to cover the essential points involved.

Because of the fact that the primary adaptation of amalgam fillings is always altered by ensuing volumetric changes or distortion, or both agencies, I have decided to consider these as integral factors in the problem of amalgam adaptation.

The methods employed for detecting faulty adaptation consist in the use of Harper's pneumatic testing machine or of several staining solutions, or a combination of both methods. The work with internal air pressure was limited to placing plugs in steel dies especially designed for the purpose, while the staining solution method was applied to fillings inserted in cavities of natural teeth recently extracted. I selected only recently extracted teeth for these experiments, working on the assumption that the attending conditions would more closely simulate the actual conditions that exist in working on living teeth in the mouth; in other words, that a probable source of error due to physical change of tooth structure, subsequent to extraction, would be eliminated. The objection to using extracted teeth for time experiments being obvious, this method could be used only to check primary adaptation.

The combination method was used on steel dies containing amalgam plugs which would resist various potentials of air pressure without visible leakage. This was done by inverting the die, and allowing staining solution to stand over night in the hole for introducing air into the bottom of the cavity; then, after pouring out the remaining solution, again subjecting the filling to internal air pressure. Almost invariably, a beautiful border of mercurochrome red would appear at the joint between plug and die when 1 or 2 pounds of pressure was applied, yet no air bubbles could be detected with the unaided eye. Some of these same fillings would resist five or ten times as much air pressure without apparent leakage when no staining solution was used.

As the test was made time and again with fairly uniform results, the evidence that accrued strongly supports the conclusion that dies will show a smaller defect in adaptation than will air pressure, when the presence or absence of air bubbles that are visible to the unaided eye are taken as an index to an impermeable joint.

This statement is just contrary to what I thought to be true before I became acquainted with the experimental facts, and, even then, I repeated the work many times before I was convinced.

The work done with Harper's testing machine was especially useful in checking changes in adaptation that occur subsequent to insertion of fillings. The permanency of the material of which the dies are composed eliminated the possibility of structural changes of cavity walls; hence, all demonstrated alterations in adaptation could be justly attributed to the misbehavior of the filling material.

After checking several hundred fillings placed by numerous operators using a dozen or more different kinds of alloys, the following results were fairly well established:

Amalgams do *not* lie still after any amount of condensation that can be effected by practical operative methods.

1. When subjected to internal air pressure, any filling may leak at different pressures at different intervals.

2. The degree of resistance to air leakage varies enormously with different amalgams, yet, strange as it may seem, the alloys produced by the most reputable manufacturers show the best averages; that is, the range of the reaction curve is confined within narrower limits, and the final adaptation after stability is obtained is far better, occasionally being superior to that which obtains after the first maximum is reached, which usually develops within from one to three hours.

Some of the cheaper alloys show a greater expansion within an hour or two after insertion, but, after a day or two, the specimen will produce a veritable geyser when submerged in water, and 1 or 2 pounds of air pressure applied. This shrinkage appears to be permanent, as no compensating reaction could be detected even when a test was made several months after the plug was placed in the cavity. The leakage became progressively worse during the time it was under observation.

It is my opinion that a certain degree of distortion also occurs in conjunction with shrinkage. It may even be the chief factor in the causation of defective adaptation subsequent to insertion. The apparent spheroiding of amalgam fillings in the mouth is a matter of common observation to us all.

3. Fillings made from the same alloy, by practical means as nearly uniform as possible, show different resistances to air pressure; i. e., they will leak at different pressures at the end of a definite period, yet, at a later time, some of the fillings, for instance, that leaked previously at 5 pounds, will withstand 10 pounds, and others which previously stood 10 pounds may leak at 6 or 7 pounds. We were not able to control such perverse behavior by any manipulative technic within our range of trial and error.

4. In all cases, there develops an immediate expansion which appears to accompany the onset of the setting phenomenon. In the majority of fillings of high grade alloys, this primary expansion is complete within from one to three hours. The improved adaptation that accompanies this expansion lasts about twelve hours, after which time there is a gradual contraction, which, in turn, continues for several days. Then a gradual secondary expansion begins to appear. Within a week, the filling may resist internal pressure as great as it was able to resist a few hours after insertion; or several months may elapse before this condition develops. In some cases the secondary expansion never develops to appreciable proportions, as evidenced by air-pressure tests. The intervention of distortion may account for this failure to return to an improved adaptation, which is the usual result with high grade amalgams.

The only textbook authority that I have found which mentions this secondary expansion of amalgam is Hodgen's "Dental Metallurgy."[1] He quotes Dr. Gray, describing the stages as follows: 1. Rapid contraction to a minimum. 2. Somewhat slower expansion to a maximum. 3. Considerably slower contraction to a second minimum. 4. Very much slower expansion to a second maximum.

He, also, states that one or more of these stages can be masked by suitable mechanical treatment. This probably explains why we have failed to detect the initial contraction which he mentions, but the variability of the secondary expansion is utterly obscure to me.

STAINING METHODS

After working with the pneumatic testing machine under conditions entirely different from those that exist in actual

1. Hodgen, J. D.: Dental Metallurgy, Ed. 6, St. Louis: C. V. Mosby Company, 1924, p. 387.

dental practice, serious doubts began to creep into my mind concerning the reliability of the pneumatic machine as an accurate means of testing the adaptation of amalgam fillings as a whole. The fact is quite obvious that the only positive check concerns the chinking up of the cracks in the interior of the cavity through which air is introduced. The joint at the margins is not checked by the test, so, from a practical viewpoint, the results are still incomplete. With this thought in mind, I decided to attack the problem from the opposite side, attempting to determine whether I could exclude moisture from cavities in recently extracted teeth filled with amalgam. The results were persistently disappointing. Under no conditions could we prevent the ingress of 10 per cent mercurochrome solution. Invariably, the interior of our cavities presented the appearance of a shambles, the staining was so intense. Usually, the entire pulpal and axial walls were also stained. In this series of experiments, we engaged the collaboration of several very prominent operators, men who believe in amalgam, and who have used it extensively for many years, but, irrespective of reputation, experience or special technics, the staining solution always found the interior of their cavities, much to their amazement and, I may add, chagrin.

After admitting defeat in using practical methods of manipulation, we next attempted to do the impossible by employing a technic offering decided mechanical advantages, yet entirely prohibitive for use in the mouth. A tooth with a carefully prepared cavity was surrounded with a band, firmly adapted and wired securely at the gingival aspect, and extending about a quarter inch above the occlusal surface of the tooth. This band was then heavily reenforced with "coecal" to resist the excessive pressure to be applied later. With a heavy hammer and a set of appropriate pluggers, the amalgam was inserted under a pressure incomparably greater than could be borne by a tooth in any mouth, until the band was overfull. Then the case containing the tooth and band was placed between the jaws of a vise and additional pressure applied to the base of the mounting and the protruding amalgam. The filling was held under this pressure for several hours, when the case was removed and the filling trimmed to the margin and polished.

After its mercurochrome bath, this cavity showed general leakage, but, in several places, the ingress of moisture was successfully repelled. Although this was the best adaptation that we were able to attain with an amalgam, it was far from being 100 per cent satisfactory; yet the filling was placed by a man who has made a reputation as an amalgam worker.

When Loeffler's methylene blue solution was used, the penetration into cavities filled with amalgam was not nearly so great as when 10 per cent mercurochrome solution was used, but it always penetrated a millimeter or two, or to a depth corresponding to the thickness of enamel.

The final question that now confronts us is the one that concerns us most as practicing dentists, "Just how useful is amalgam as a restorative material for lost tooth structure?" Surely, if we demand a moisture proof filling, amalgam falls short of the requirements, even though the leakage may be slight. It may be true that an absolutely water-tight filling is not necessary to the protection of internal tooth structure. Since it is established that a solution containing myriads of bacteria can be entirely sterilized by passing through a Pasteur filter, isn't it tenable to assume that a well placed amalgam, as far as its adaptability goes, acts as an effective filter of oral se-

cretions, and prevents the invasion of the micro-organisms that cause dental caries? Enamel cracks undoubtedly leak to a certain extent, but decay seldom occurs in the underlying dentin at these points unless carious destruction of enamel has previously occurred. Again, the chemical nature of amalgam may exert an inhibiting influence over carious processes. This speculation, of course, involves a point which has been the subject of controversy in dental literature for many years. I am inclined to believe that amalgam does inhibit caries, and the success of well-made amalgam fillings depends largely on filtration of oral fluids plus the prophylactic action of amalgam. Certain writers reject the prophylactic theory on the assumption that only sulphides are formed, and, since the sulphides are insoluble, no antiseptic properties are developed. Such a conclusion merely reflects the complacent limitations of those who express their opinions in such a careless manner. As a matter of fact, the formation of a wide range of chemical compounds is possible, when we stop to consider the multifarious substances that are mixed with the salivary secretions, and, until definite and authoritative analyses of stained tooth structure under amalgam fillings settle the question with finality, it must remain as a subject for polemic discussion among dentists.

Returning to the central theme of this essay, I wish to summarize the experimental material I have tried to present thus far.

1. No adaptation of amalgam was attained that would successfully resist the ingress of staining solutions in natural teeth.

2. Although fillings could be made in simple occlusal cavities in steel dies quite uniformly that would stand from 10 to 50 pounds of air pressure, fillings placed in step cavities fell far short of this standard. For reasons previously stated, I consider this method open to serious objection when used to check adaptation of the filling as a whole.

3. Fillings placed in steel dies which did not show visible leakage under air pressure alone did show leakage when mercurochrome was introduced into the air hole and air pressure again applied.

4. In all cases in which air pressure was employed, the plugs showed varying degrees of resistance to this pressure when tested at different intervals.

5. Alloys made by the larger manufacturers of dental materials showed decided advantages over the more nondescript varieties.

6. As compared with gold foil fillings and inlays, which did not leak staining solution in any case, the adaptability of amalgam was far inferior. Several kinds of cements were used, including "kryptex," all of which excluded infiltration by dyes.

I quote from Black's "Operative Dentistry," regarding the status of amalgam as a filling material:

> Much careful study and experience are required to work it well. Its resistance to attrition is good; its capability of resistance to the force of mastication is excellent in the material itself. But at the time it is placed in the cavity in a tooth, it is too soft and yielding to sustain any considerable degree of the elasticity of dentin, and the sustaining power this mutual relation would give is lost to amalgam. No matter with what force the condensation and wedging is made against the walls of the cavity, this material will yield, will be pushed aside and its form so changed as to accommodate this elasticity almost or quite completely; and the additional sustaining power that this mutual relation of the cavity walls and the filling material, the grip of the cavity on the filling, which is the prominent feature in gold, is lost to amalgam even with the best possible manipulation. This in itself must ever confine amalgam to an inferior place as compared with gold as a filling material. The possible shrinkage or expansion of amalgam after the filling is made must ever

be a shadow over its usefulness. Though, when all due care is taken in making and testing alloys to see that the balance of the metals is exactly correct, this difficulty is eliminated. Yet, the fear that this has not been perfectly done will be present.

From this passage, it appears that Dr. Black was well aware of the treacherous behavior of amalgam, and, although his efforts brought into existence the modern balanced alloys, he certainly knew their limitations.

Our investigative work, as a whole, has done little more than corroborate what he tacitly stated in a few paragraphs many years ago.

519 Selling Building.

IMPORTANCE OF CASTS IN PERIODONTIA PRACTICE*

By ISADOR HIRSCHFELD, D.D.S., New York City

IN a previous paper,[1] I had occasion to refer to three means of recording periodontal disease, in addition to the use of roentgenograms: diagrammatic charts, casts and photographs, but only the first was described in detail at that time. It is the object of this paper to enlarge on the second, i. e., casts, by pointing out more specifically their purposes, and the advantages accruing from their routine use in daily practice. Although no one of the three methods *per se,* is indispensable in treatment, the ideal procedure might include them all, since each has possibilities that the others lack. As between casts and photographs, the former are by far the more useful because of their greater potentialities with reference to study, and especially because they make possible greater accuracy in recording certain details.

In the practice of orthodontia, the routine use of casts for study and record, in addition to appliance construction purposes, is axiomatic and obviously considered indispensable. It is to be regretted that in periodontia this is an ideal yet to be attained; for, without casts, scientific and clinical progress is considerably curtailed. In attempting to analyze this conspicuous shortcoming, one feels that it is due not so much to indifference on the part of the practitioner, as to the fact that periodontia is still in the pioneer stage and, accordingly, the manifold advantages resulting from the use of casts have not yet been effectively called to the attention of the profession, either through literature or through curricular study.

Notwithstanding periodontia service may be successfully rendered without casts, I have found their routine use over a period of approximately fifteen years most advantageous. I therefore welcome this opportunity to point out some of the innumerable benefits that have accrued to both myself and my patients from their use, and to recommend most enthusiastically their use in everyday practice.

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*Read before the Section on Periodontia at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 15, 1932.

1. Hirschfeld, Isador: Diagrammatic Recording of Periodontal Disease, J.A.D.A., 18:1927-1943 (Oct.) 1931.

Briefly, the making of casts, as a part of periodontia service may be of invaluable help in the following respects: (1) in the detection and correction of traumatic occlusion and food impaction mechanisms; (2) in the recording of anatomic abnormalities, and their progressive changes during and after treatment; (3) for the purposes of demonstration to the patient, and (4) in the early planning of postoperative restorations and in determining, accordingly, the prognosis of certain questionable teeth.

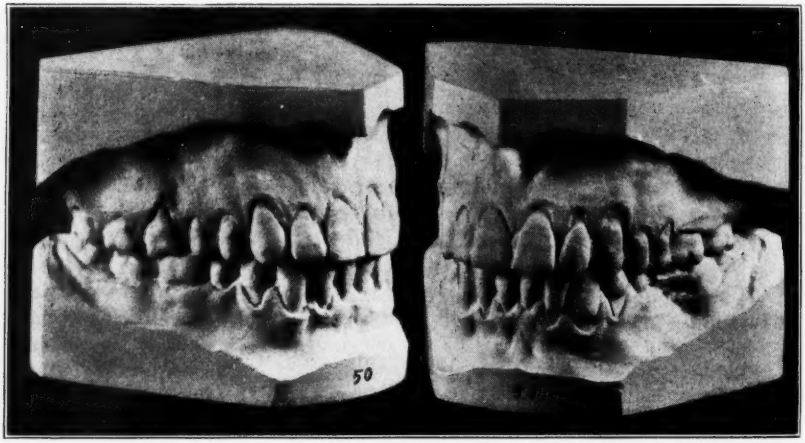

Fig. 1.—Toothbrush trauma recession in a man, aged 30. The left side gives the typical picture; namely, maximum gingival recession over the cuspids with the gradual diminution over the adjoining teeth; also evidence of mechanical abrasion at the necks. The recession ceased on correction of the brushing. After six years of periodic checking up with a measuring device (Fig. 2), no further recession could be detected except over the upper right first molar (marked on the cast by a lead pencil point). Such cessation of recession, proved with casts in numerous similar cases, establishes the fact that improper tooth brushing is the essential etiologic factor, and that, accordingly, a corrective change in the brushing method is the only treatment necessary.

Comparatively little of the knowledge accruing from investigations into the systemic source of periodontal disease can as yet be put to practical use in its treatment. On the other hand, local etiologic factors, especially the macroscopic, have been fairly well established, and the more or less successful application of this information has become a matter of daily incidence in periodontia practice. Outstanding among the more persistent local mechanical factors are traumatic occlusion and food impaction. Traumatic occlusion between the teeth *per se* may be readily diagnosed, but when it is produced only through the medium of a morsel of food, the operator must rely largely on his imagination in attempting to determine the traumatizing mechanism. This is also true in the case of food impaction, and, in both instances, he may be helped considerably by a leisurely study of those conditions reproduced in the casts. Furthermore, the occlusal relationship may be observed from the lingual aspect with the jaws

in occlusion; which obviously cannot be accomplished in the mouth. One may also, by outlining with a pencil, record on the casts the exact location of surfaces or cusps ground for the elimination of food impaction or traumatic occlusion.

Accurate records of the degree of gingival recession caused by toothbrush trauma can, perhaps more than those of any other periodontal condition, be a source of great satisfaction to both operator and patient. This can be readily understood when we realize that such recession occurs essentially in individuals who are particularly desirous of maintaining dental and periodontal health either because of vanity, or of vocational requirements, as in the case of actors, public speakers, salesmen, etc., also in

Fig. 2.—Evslin parallelometer, used by author for comparative measurements on casts. By this means, the amount of gingival recession and the extent both of drifting of teeth and of interdental space formation may from time to time be definitely ascertained; also other changes in the dental arch.

those who are inordinately concerned about their health in general. Such a person brushes his teeth with so much zeal that gingival recession is often inevitable. Obviously, his slightest suspicion that recession is taking place or that it is becoming more marked is sufficient to play havoc with his peace of mind. (Fig. 1.)

Although this form of recession is almost invariably controlled simply through a discontinuance of the traumatizing method of brushing, the patient is rarely convinced that its progress has actually stopped, and his anxiety concerning it, from time to time, can be completely allayed only through a comparison of the measurements in the mouth with the amount of recession on the cast made at the beginning of treatment. (Figs. 1, 2 and 9.) The operator experiences great satisfaction in being able to accomplish this, and, at the same time, the patient's confidence is completely maintained and his continued cooperation assured.

Similarly, casts serve to negate any suspicions on the part of the patient that, in spite of treatment, the pathologic enlargement of interdental spaces is progressing or that the drifting, torsion or extrusion of the teeth has become more marked. (Fig. 3.) Furthermore, patients sometimes express considerable anxiety because they feel certain that new abnormalities are developing. On comparison of the mouth with their casts, they are agreeably surprised to find not only that these had existed at the beginning of treatment, but also, the more important fact, that they had actually become less marked. The embarrassment from which the operator is thus saved can be best appreciated by those who have at some time experienced it through lack of such records. More than that, unscrupulous patients are occasionally not beyond deliberately utilizing similar contentions as a means of justifying failure to meet in entirety their monetary obligations for services rendered. I have on more than one occasion taken pleasure in invalidating the claims of such a patient by producing his casts as indisputable evidence.

I am particularly enthusiastic about the advantages of a progressive series of casts, made at given intervals or on evidence of decidedly marked improvement, in the treatment of chronic hypertrophic gingivitis. Because the comparative rate

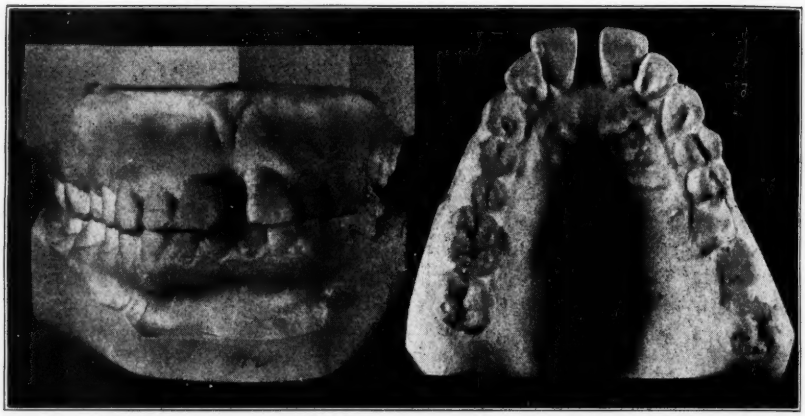

Fig. 3.—Casts (made before treatment) of case showing advanced pyorrheal destruction. After completion of treatment, the patient agreed that the gums looked and felt well, but she was nevertheless under the impression that the upper central incisors were "drifting further apart and continuing to protrude outward." A comparison of her mouth with the casts proved instantly that she was wrong: the interdental space had in fact become considerably smaller and the teeth had returned slightly toward their original position in the arch. The latter is indicated by the pencil point marks near the mesial corners on the incisal edges of the central incisors. These were measured, on the right side, from a marked occlusal groove on the first molar, and on the left, from a similar point on the third molar. (Grooves are more reliable landmarks for future comparison than are the points of cusps, since the latter tend to wear off.)

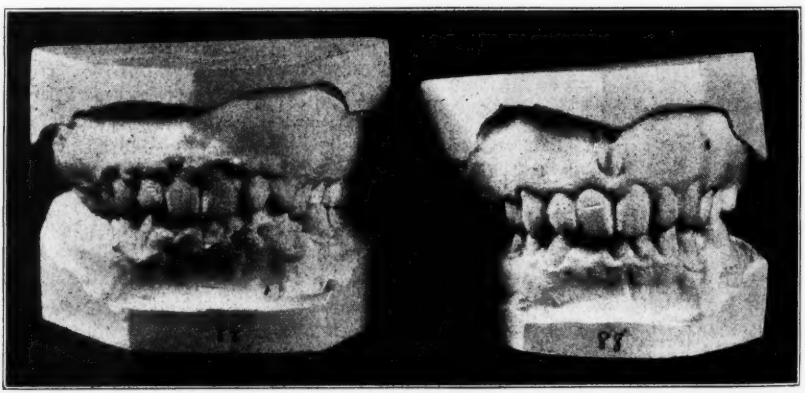

Fig. 4.—Chronic hypertrophic gingivitis caused essentially by mouth breathing. The casts on the right side show the condition before treatment and those on the left, the condition one year later. Several progressive series of such casts used for demonstration give prospective patients the desired confidence in the probable prognosis of their individual cases.

of progress achieved can in this way be recorded accurately, the operator can be guided in his plan of procedure more efficiently than when he depends on memory alone. For instance, in a case of hypertrophic mouth breathing gingivitis in a mouth with an irregular dental arch, if a comparison with each successive cast gives evidence of decided improvement, the routine treatment is continued, but if no change can be noted after a lapse of one or two months, orthodontic interference is indicated. Besides, the definite evidence of improvement helps to maintain the patient's enthusiasm and thereby his continued cooperation, which is an essential factor in the successful treatment of this condition.

Fig. 5.—Cast of horseshoe-shaped dental arch, showing how part of buccal surface of second molar and entire surface of third are often missed by toothbrush. This defect in brushing technic and its correction are best explained to the lay patient with the aid of the cast (Fig. 6).

Occasionally, a patient who comes for consultation regarding the possibility of reducing a gingival hypertrophy through conservative treatment is very skeptical because he had been erroneously informed that gingivectomy or extraction, or both, was the only practical means of successfully coping with the condition. Under such circumstances, a demonstration of the progressive stages in improvement and ultimate success by means of casts taken of a similar condition (Fig. 4) is obviously more convincing and effective than any verbal assurance.

Some patients grasp more readily the significance of specific instruction in tooth brushing and the reasons for the corrections advised when they are demonstrated on a cast of his mouth or at least on one presenting a similar condition. This is especially true when the uncleaned buccal surface of the upper third molar in a horseshoe shaped arch is involved (Figs. 5-6); also, when the lingual surfaces of lower teeth are inclined too far lingually.

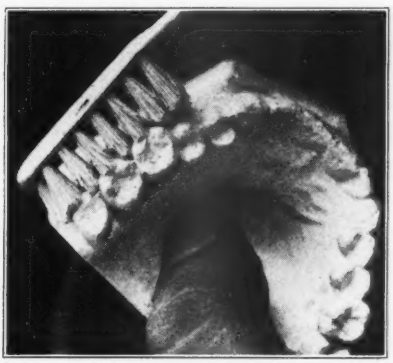

Fig. 6.—Cast shown in Figure 5; proper position of brush, handle pointing outward so that end bristles can reach and cleanse second and third molars.

Casts may aid materially in the planning of postoperative restorations, which must frequently be made early in order to decide, at the very beginning of treatment, the prognosis of certain questionable teeth, thereby obviating unnecessary

expenditure of time, effort and, probably, expense. For instance, some teeth with marked periodontal destruction could be rendered permanently healthy and useful if left unencumbered by bridges, etc. On the other hand, teeth with even greater loss of supporting structure, and which may therefore remain very loose at the conclusion of treatment, are often considered of negative prognosis unless postoperative appliances can be made which will help to stabilize them. This study may require considerable time and can therefore be more satisfactorily completed when casts

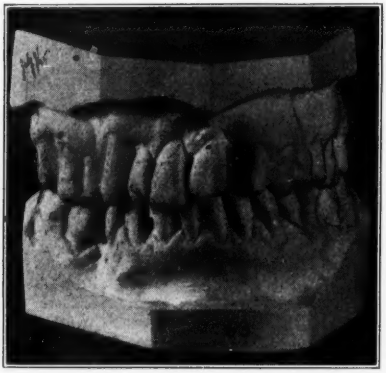

Fig. 7.—Casts showing the extreme drifting of upper anterior teeth toward right as a result of nonreplacement of missing first bicuspid. In addition to an inharmonious occlusion, this also resulted in the large space formation between the left central (which had completely crossed the median line) and lateral incisors. The lower teeth, too, drifted in the same direction for a similar reason.

are available. To the periodontist, casts prove invaluable also in planning restorations in consultation with the general practitioner in the absence of the patient, or over the telephone.

Next to safeguarding his patient against the loss of any permanent tooth, the dentist's foremost duty is to urge early replacement of a lost tooth. Otherwise, the inevitable drifting or extrusion of the neighboring teeth may cause complete disarrangement of the entire masticatory apparatus; which, in turn, can give rise to a series of no less than twenty types (some of which I listed in a previous paper[2]) of abnormality or disease in various parts of the mouth, even at points quite distant from the site of extraction.

Because periodontal disease is so frequently caused or at least fostered by such disarrangements of the dental arch, the periodontist who makes casts routinely can readily collect a comprehensive

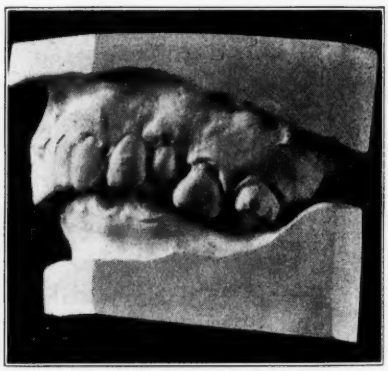

Fig. 8.—Extreme elongation of left upper molars together with their periodontium, produced essentially by neglect to replace missing lower opponents. These teeth now occlude against the opposite gingival ridge, although most of the posterior teeth on the right side remain intact.

series of various types of irregularities produced by nonreplacement (Figs. 7-8) to use for demonstration purposes. He will find these a simple and effective means of convincing the patient that tooth replacement at an early date is of vital importance. A general practitioner

2. Hirschfeld, Isador: Mechanics of Mastication in Relation to Health of Periodontium, J.N.D.A., 9:120 (Feb.) 1922.

often hesitates to urge too strongly that restorations be made lest he be suspected of an ulterior motive. I feel convinced that he could do so more freely if he could demonstrate the necessity for the restoration with such convincing evidence. A mere warning without the aid of sample casts is likely to fall short of its purpose, especially when the patient had been previously advised against it by a well meaning, but comparatively uninformed practitioner who believes that the advantages from the use of an additional tooth are not commensurate with the possible damage from encroachment on the two healthy adjacent teeth. With the improved technic in partial denture construction, and better appreciation, and carrying out, of oral hygiene, such an argument is no longer tenable.

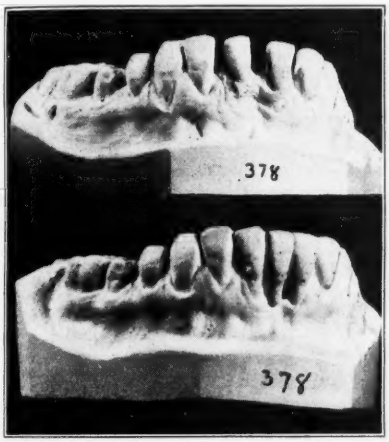

Fig. 9.—Above: Cast made prior to insertion of one-tooth pinledge bridge between central incisors. After successful treatment of an advanced pyorrheal condition, these teeth had been stabilized for over ten years by a crude splint consisting of two gold bands soldered together. The periodontal health acquired was maintained through enthusiastic mouth hygiene, but the hard brushing evidently forced down the gingiva over the right cuspid, leaving the root considerably exposed. Below: Two years later, after correction of the tooth brushing technic. The gingiva over the cuspid is seen to have regenerated about one-eighth inch (as indicated by the pencil point mark in the upper picture). Although this tissue is not actually attached to the root surface, it hugs it closely and is pink and hard and otherwise healthy. The suggestion of such a phenomenon (which has been duplicated in a number of the author's patients) would be considered fantastic had the record casts not been available as evidence.

The usefulness of casts extends beyond the purposes listed above, which were mainly concerned with the more satisfactory conduct of routine practice. In the field of research, study and education, its scope is unbounded, offering to the dentist with a degree of vision limitless material for the advancement of periodontology.

A collection of accurate casts made before, during and after treatment, supplemented by reliable case histories, diagrammatic charts, roentgenograms and photographs, can be utilized as a definite, effective unit for clinical research. By this means, one may arrive at a more accurate conception of local causes, an improved technic in certain phases of procedure in treatment and a broader view as to prognosis.

My collection of several hundred sets of casts, in conjunction with my other records, has helped me to ascertain numerous interesting clinical findings:

1. The etiology of the nonpathologic exposure of the palatal root of the upper first molar, particularly when its opponent had long been missing.[3]

2. Differential diagnosis of the root

3. Hirschfeld, Isador: Study of Skulls in American Museum of Natural History in Relation to Periodontal Disease, J. D. Res., 5:241-265 (Dec.) 1923.

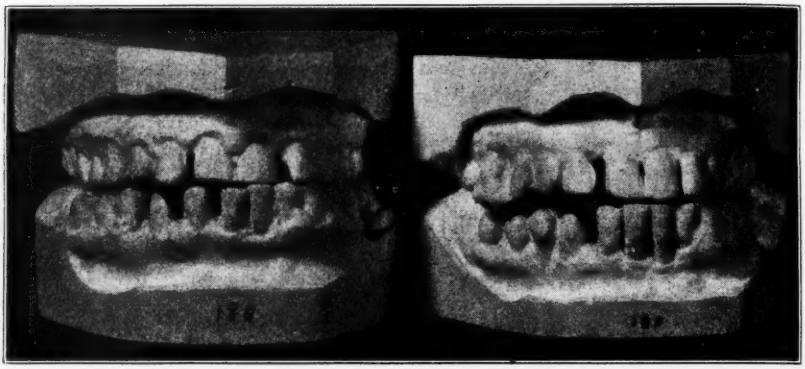

Fig. 10.—Casts of girl, aged 19, who presented generalized, extremely advanced pyorrheal condition. Those on the left side were taken before treatment was begun; those on the right, several years after completion of treatment. It will be noted that, with the improvement in periodontal health, both the upper and lower arches became considerably smaller, the teeth which had formerly protruded labially returned toward their normal position and most of the interdental spaces became smaller or entirely disappeared.

Fig. 11.—Casts shown in Figure 10; occlusal view. Both arches became smaller by between two-sixteenths and three-sixteenths inch in every diameter.

exposure caused essentially by improper tooth brushing technic.[4]

3. Evidence (Fig. 9) that on the discontinuance of such technic, the gum tends to grow back.[5]

4. Enumeration of various types of irregularities in the arch produced by tardy, or complete omission of, restoration of missing teeth.[2]

5. Diagnosis, etiology and reduction of numerous types of food impaction mechanisms.[6]

6. Corroboration of the observations of other writers that there is a definite relationship between the direction in which a pathologically wandering tooth moves and the location of the subgingival granulomatous tissue which, through its expansive action, causes the tooth to migrate.[7]

7. Proof that such teeth, as a result of proper treatment, may not only be made healthy and retained permanently, but also may, and frequently do, return to their original location and position[7] in the arch, without orthodontic aid, not-

Fig. 12.—Casts (left) of a patient who came in for relief of feeling of pressure (which had continued for several months, between upper right central and lateral incisors), such as is produced by food impaction. No food could be found there by either the patient or the operator. A comparison with the casts (right) made two years prior proved that the lateral incisor had since then moved into close contact with the central. This was evidently caused by the expansion pressure of granulomatous tissue in a new pyorrheal pocket found on the distal side of the lateral incisor. The pencil point marks on the gingivae record the comparative degree of recession after the conclusion of treatment. These serve as records for future comparisons.

4. Hirschfeld, Isador: Some Types of Periodontoclasia, and Diagnosis of Their Incipient Symptoms, D. Items of Int., 48:823 (Nov.) 1926.

5. Hirschfeld, Isador: Toothbrush Trauma Recession: A Clinical Study, abstr. J. D. Res., 11:61-63 (Feb.) 1931.

6. Hirschfeld, Isador: Food Impaction, J.A.D.A., 17:1504 (Aug.) 1930.

7. Hirschfeld, Isador: Relationship Between Migrating Teeth and Inflammatory Tissue in Pyorrheal Pockets, abstr. J. D. Res., 10:383-384 (June) 1930; Dynamic Relationship Between Pathologically Migrating Teeth and Inflammatory Tissue in Periodontal Pockets: A Clinical Study, J. Am. Acad. Periodontol., to be published.

withstanding statements to the contrary by some writers.

8. The fact that, in certain types of conditions, the dimensions of the dental arches may be considerably reduced in every diameter as a result of successful periodontal treatment. (Figs. 10-11.)

9. The fact that the subjective symptom of interdental pressure, although there is no actual food impaction, is caused by the forcing of a tooth against its neighbor through the expansive pressure of inflammatory tissue in a pyorrheal pocket on the opposite side of the tooth.[7] (Fig. 12.)

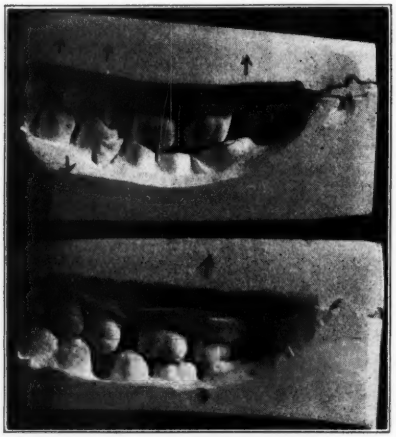

Fig. 13.—Articulated partial casts made from a "mush" bite. These are made very readily and serve quite effectively for the study of food impaction mechanism. The pencil markings on the cusps record the points ground for the reduction of food impaction.

10. The fact that the pathologic extrusion of teeth out of their sockets may cease automatically after proper periodontal treatment.

Casts are frequently more adaptable for illustrative purposes in publications than is any other material.

For teaching purposes in undergraduate or advanced classes, selected illustrative sets of casts, presented intimately to a small group of students, are a most effective means of interesting the student in, and impressing him with, the source and prognosis of certain abnormal or pathologic entities which would otherwise be difficult to demonstrate. Finally, such collections, supplemented by the additional records mentioned above, in college museums may be very fruitful material for the continued development of periodontology and for the better preparation of new recruits in this field.

REQUIREMENTS OF CASTS

In order that casts may be utilized to the fullest extent for the various purposes above outlined, it is obviously necessary that they be true reproductions of the original. The gingival margins and incisal edges must be sharply defined, the contour of the cusps fully brought out and the occlusal fossae unobliterated. The impressions should include the entire alveolar gingivae, also the hard palate, its posterior part being omitted only when gagging cannot be otherwise controlled. It is advisable usually to include the entire jaw even though a record of only certain parts may be required for immediate purposes, because it may be of advantage to the operator at some future time to have a more complete record so that he can check up on a new complaint or inquiry by the patient, or on some point he had previously failed to observe in the mouth. Such contingencies arise sufficiently often to warrant the slight additional work required in the taking of full impressions.

As a matter of accuracy, plaster is probably the safest medium for impression taking, but the recently devised compounds, properly used, may serve equally well in many cases, and may reduce considerably the time otherwise required. When plaster is used, care must be taken,

in assembling the pieces, to avoid an increased or decreased width of the arch in order to prevent a false reproduction of the occlusion. When an individual food impaction or traumatic occlusion mechanism is to be reproduced, a mere local squash bite usually suffices. (Fig. 13.) A single layer of cellophane incorporated in the middle of the softened baseplate wax serves to prevent the complete penetration by the cusps.

The impressions should be taken before the beginning of treatment, or as soon thereafter as possible, in order to secure a record of the condition as it first presented itself and to avoid interference with the routine treatment by tardy completion of the casts. When progressive casts are desirable, each successive one is made when a definitely marked stage in improvement is noted, or at regular intervals, according to the purposes in mind. In the case of clinic patients or others who are likely to discontinue treatment suddenly, the operator must not wait for his "final" cast until the treatment is entirely completed, if he values it as a record.

CONCLUSION

This paper was written essentially for the general dental practitioner in the hope that it may stimulate his interest in periodontia as a scientifically accurate branch of dental service, help him to practice it with greater definiteness and satisfaction and encourage him to accumulate available data as a contribution to clinical research in periodontology.

SUMMARY

1. Although periodontia service may be successfully rendered without the aid of casts, their routine use in practice is strongly recommended for the many advantages accruing both to the operator and to the patient and for its great value as material for clinical research.

2. In periodontia service, the making of casts may serve to particular advantage in (1) the detection and correction of traumatic occlusion and food impaction; (2) the recording of anatomic abnormalities and their progressive changes during and after treatment; (3) the demonstration of existing conditions to the patient, and (4) the planning of postoperative restorations and determining, accordingly, the prognosis of certain questionable teeth.

3. In addition, selected casts used as convincing evidence of the advisability of early replacement of extracted teeth may serve as an important factor in preventive dentistry.

4. Perhaps the outstanding purpose of casts is their use for comparison in checking up on toothbrush trauma causing recession. The patient appreciates the value of this conclusive evidence no less than does the operator.

5. Through a study of a large collection of accurate casts, supplemented by case histories, diagrammatic charts, roentgenograms and photographs, one may arrive at a more accurate conception of local etiologic conditions, an improved technic in certain phases of procedure in treatment and a more logical viewpoint on the prognosis of periodontal disease.

6. Casts may be used to advantage as illustrative material in publications and for instruction. In the college museum, they may prove fruitful material, when supplemented by the additional records above referred to, for the continued development of periodontology.

7. In order to be fully useful for the foregoing purposes, casts must obviously be as nearly true and complete reproductions of the original as is reasonably possible.

730 Fifth Avenue.

ARTIFICIAL DENTURES — THE FINAL STAGE IN RESTORATIVE DENTISTRY*

By RUSSELL WILFORD TENCH, D.D.S., New York City

CLOSE observation of the mouths of persons about to reach the last stage of restorative dentistry, of those who have recently reached it and of those who have long ago reached it has led me to wonder whether we do not frequently postpone this final stage for many of our patients beyond the time when it has properly been reached. The startling difference between the ease with which younger persons learn to wear artificial dentures and the continued difficulties of some of their elders being newly introduced into the sphere of denture wearers makes one pause to consider. Our attitude as a profession toward this subject reflects our doubt of our own capacity to deal with the edentulous mouth. If we, as a profession, knew that we were certain to obtain results, no doubt we would have the courage to act sanely in the matter of making the decision as to when this final stage has been reached, and if, and when, we do reach this stage of proficiency, a rather large percentage of those now wearing partial dentures of rather doubtful design will be full denture patients, and be happier as a consequence.

The general physical condition may be seriously affected by foci of infection about the teeth and penetration of infection into bone adjacent to teeth. When such a condition exists, the removal of the offending teeth and the removal of at least a large part of the actually infected bone is advisable and should be accomplished as soon as the condition arises or becomes evident.

Beyond question, the vitality of bone and the ability to resist change under stress of masticating force are affected by the state of the general health. If the source of this interference is dental, the dental cause should be removed. If it is not removed, every month or year elapsing sees the gradual development of an increasingly unfavorable condition for denture wearing, due to general impairment of bodily function as well as local disintegration and destruction of the bone areas over which dentures must be adapted.

I wonder if we understand the full significance of the disintegration of dental tissues. It is a symptom of dysfunction at least, and often of actual disease.

Decay and pyorrhea or peridental disturbances are manifestations of disease, whether due to nutritional deficiencies or organic or glandular dysfunction. When teeth are lost purely as a result of caries and before root filling operations have been performed, the physical form of the edentulous ridges appears to be universally better and the physiologic reaction of the mouth tissues to the presence of dentures is more favorable than under any other conditions. The entire denture experience of such patients is more satis-

*Read before the Chicago Dental Society, Nov. 15, 1932.

factory, perhaps because their denture experience begins earlier in life, when all conditions are most favorable to the patient's adjustment to the problem of using full dentures. The more advanced the age of a patient, the more difficult it seems for him to become acquainted with and adjusted to the presence of dentures in the mouth. Patients between the ages of 18 and 30 usually wear dentures with very little trouble either to themselves or to the dentist, while patients of 60 frequently go through a trying period of several months or years before becoming adjusted to this strange condition, even under the most favorable methods of procedure. The young patient may wear dentures made to meet a recent extraction condition for several years without rebasing or other changes, while the older patient may require frequent rebasing and frequent adjustment owing to loss of occlusion in the first years of their denture experience.

The greater ease with which healthy young persons adjust themselves to new conditions, and the comparatively higher vitality of the bodies and oral tissues of young patients, are responsible for the almost unvarying facility with which they learn to wear dentures. The inevitable conclusion is that there is usually more to be gained in comfort for the prospective denture patient by early acceptance of the fact that they will eventually become edentulous. The early removal of diseased teeth obviates systemic sequelae following dental infections, as well as the adverse local effect of such infections on the physical shape and health of ridge tissues. Certainly if we are not ready to adopt a forward looking attitude regarding the removal of all teeth when the mouth is in a very bad state of health, we should at once be willing to adopt the view that miscellaneous teeth may be removed to advantage, especially when such teeth are situated on one side of the mouth, rather than leave them, in the usually mistaken hope that they help in retaining dentures. Two vital cuspids or two vital first molars may, under certain conditions, be useful, but to leave one is to invite trouble for both patient and dentist.

The foregoing remarks constitute the broad view of the subject. This view must be modified when the physical conditions of the ridge form and relation intervene, or when the advanced age or impaired health of the patient may indicate that it is too late to do more than render the mouth clean. If vital teeth are present and so placed that they may give bilateral support to a partial denture or removable appliance, under certain conditions it is better to make the most of their presence. Such a condition is present when the upper vault of a patient of low vitality and past 40 is very flat and of much smaller buccolingual dimension than the lower. If two vital second or first molars and a bicuspid, or one bicuspid or more are present, it may be wiser to utilize them to retain a partial denture. This type of case is too extreme for extraction of all teeth to be assuredly beneficial. The unfavorable flatness and narrowness of the denture area is a fact, and the age of the patient, plus the leverage conditions incidental to placing of artificial teeth, may eventually constitute the loss of abutment teeth, but, in the meantime, such a patient may often be afforded a longer period of comparative comfort by retaining the teeth, if vital; in other words, making the best of a bad condition.

When the character of the bony support of the teeth is such that a knife-edge ridge may be left after teeth are extracted, every effort should be made to save and utilize good teeth for abutments to take up the stress of mastication from a ridge

too narrow or delicate in shape to bear it with comfort to the patient. The two conditions that might alter the view about early removal of teeth are then, to repeat, the possibility of unfavorable ridge shape and unfavorable differences in the ridge relations.

When the decision to remove a large number of teeth is made, for whatever reason, we, as a profession, owe it to our patients to call to their attention the fact that records can be made before extraction which will be an invaluable guide to accomplishing a restoration of their appearance to the preextraction normal or as nearly to it as possible corrections of conditions bordering on deformity may make desirable. Even though the dentist assumes that the patient's financial status may preclude his willingness to pay for such records or the possibility of using them at that immediate time if made, every patient should be informed that the records can be made, of their value and use and of the fact that they can always be used if, and when, the patient's financial condition makes him feel that he can afford to be so treated that he will look his best to his fellow beings. There is no way of estimating the value of appearance to one's social or business success, but everyone knows that it has a value.

The first record previous to extraction should be a full mouth roentgen-ray examination. Many men who limit their operations to extractions and surgery insist on this. It should always be a matter of routine practice. Many conditions which will render dentures uncomfortable or unwearable will, if not recognized and removed in preparation for dentures, cost the dentist a great deal in lost time or a lost fee for appliances asserted by the patient to be unsatisfactory. It is often quite difficult to differentiate between soreness or pain caused by a deformed denture surface pressing on healthy tissue and a properly adapted denture surface pressing against tissue under which is a necrotic or cystic area or a fragment of root or of amalgam filling. I will cite two instances of many in which patients endured years of agony with dentures made uncomfortable by, in one case, a piece of amalgam filling bedded in the bone and, in the other case, a root that had been overlooked twenty-seven years before. The root was probably also responsible for a glandular infection of the neck that required a rather extensive surgical operation. Both patients refused a roentgen-ray examination and have been very comfortable since finally yielding to suggestions which ended in the removal of the interfering substances.

In another case, I was recently consulted regarding a soreness in the right upper lateral region. The trouble here was a cyst, with a sinus opening on the ridge surface.

The second important records are half-size photographs of the patient smiling and in repose, full face and profile. The repose pictures should be made with the posterior teeth in contact. A ruler should be supported in a vertical position with the scale in contact with the nose and presenting to the camera, when the repose profile is made. The scale on the ruler can be used as a guide for enlarging the half-size photograph to natural size for the purpose of making a profile cut-out to fit the face, on which a further record of the relation of the lower and upper incisor teeth to the lip, both horizontally and vertically, can be made.

This record is made by placing the profile card in place on the face. A flat graduated scale is then inserted between the lips so that the end of the graduated scale is in contact with the labial surface of the lower incisor tooth and lightly

pressed upward against the cutting edge of the maxillary incisor. With the ruler projecting across the card, a horizontal line is made on the card along the upper edge of the ruler. A vertical line is marked on the card at any predetermined point on the ruler scale. The ruler is now advanced to contact with the labial surface of the maxillary incisor and another vertical line is drawn on the card opposite the same scale-reading used for the first vertical line. The difference in position of these vertical lines represents the overjet of the maxillary incisor over the mandibular. The horizontal line represents the level of the cutting edge of the maxillary incisor. By reversing the procedure of making these tooth-lip-relation records, the relative relation of the incisor teeth to the patient's face may be determined in inspecting the trial dentures in the mouth.

Wax or compound impressions of the remaining teeth of both jaws are made. These should at least include all teeth present from the central incisor to and including the second bicuspids. These impressions are saved, the extracted teeth are placed in them and plaster is poured into the impression and around the roots of the teeth. A wax centric occlusion bite may be made previous to extraction and the tooth-bearing casts mounted in an inexpensive hinge articulator to show the actual relation of lower to upper teeth. In addition to the impressions for the extracted natural teeth, one of the full upper and full lower denture may be made in "dentocoll" for a record, if desired. When there are several posterior teeth present, such casts guide one in placing the posterior artificial teeth in a suitable relation to the ridge. With such a record, one has the advantage of being able to know how the placement of the posterior teeth should be effected to be most comfortable from the beginning.

The problem of how to proceed with extraction is a question that may be more conservatively dealt with than it has been, at least in some quarters, in the not far distant past.

The problems confronting us here usually fall under three headings. First, I should place infection; second, excessively prominent maxillary tuberosities, and third, an excessively prominent or long superior anterior ridge.

The removal of infected matter, in which I will include remnants of roots or other substances found in the alveolar ridge of the edentulous, should be recognized as a necessity. It should be thoroughly but withal conservatively accomplished. The infection should be eliminated, whether root, cyst, granuloma or infiltrative, but, in removing the infection, let the operator not lose sight of the fact that easy access for him to the involved area may be had usually at the expense of the destruction of ridge form vitally necessary to the future comfort of the patient when wearing dentures. The oral surgeon should either thoroughly familiarize himself with the exact nature of the problems of esthetics and ridge relation involved in building dentures or insist on the dentist's referring the case, definitely indicating, on study casts of the full mouth, just how much change in the physical form of the ridge is necessary for either retention of the denture or to improve the appearance over all. In planning, even on casts, there are two cardinal points to remember: first, ridges do not grow and, second, the farther a tooth has to be projected horizontally beyond the middle of the ridge, the less favorable the picture. Every vestige of the original ridge that is healthy should be left intact, if not interfering either by its shape or by limiting too acutely the space in which the denture must be built. Sharp spiculae

should be dressed smooth, but not more than the gingival quarter or third of the labial plate should be removed unless some radical condition demands.

It is quite generally conceded that all posterior teeth should be removed, allowing the sockets to heal over nicely, before proceeding to the removal of the anterior teeth. This affords a more substantial base upon which to receive the thrust of mastication.

The idea of immediate denture service has enjoyed an appreciable revival in recent years. When such service can be rendered a patient without injury to his future comfort, there can be no objection to its use. Its employment is not always indicated. The results are usually most satisfactory when it is employed for young patients presenting no picture of periapical infection. For tiding a patient over the interval between extraction and the insertion of new dentures, I prefer the temporary denture of Campbell, which is, as you know, built on a foundation of baseplate, the teeth being attached with light pink sealing wax.

When dealing with older patients, this method is especially to be recommended, as a wait of forty-eight hours may usually be allowed to precede the taking of the impression. This allows Nature to begin the consolidation of areas that were infected. When teeth are removed because of periapical infection, it would seem a much safer plan to await the indications that the sockets are free of infection and the initial swelling following extraction has subsided before placing any form of denture in the mouth. For patients advanced in age, this is especially true.

The theory has been advanced that immediate dentures help build up the ridge to a better form. No conclusive evidence that this has been accomplished has ever been shown, although concededly it might be accomplished when dealing with very young patients, who usually do not need it. It is beyond belief that consistent results in developing better formed ridges for older patients can be accomplished through stimulating new bone growth in excess of the remnant left after extraction, no matter what presently available means are employed.

As to the great comfort the patient is supposed to enjoy from having the traumatized ridge tissues covered by an immediate denture, opinions of patients are about evenly divided for and against the idea after experiencing it, statements of dentists to the contrary notwithstanding.

The subject of impressions has, I understand, been covered, but I must say just a word on the subject. Care should be exercised to avoid overcompression or overcondensation of the tissues covering the vault and buccolabial aspect of the maxillary denture area. The ridge crest may not resent slight condensation, but the other areas contain structures that cannot exercise their normal physiologic function if subjected to continual pressure. I would rather wear a denture made on a good old fashioned full plaster impression, made with soft plaster, than subject the tissues of my mouth to the tissue condensation resulting from impressions made with plaster at the setting point or compound traced on the surface of a closely fitting tray, unless the compound is rendered uniformly soft from surface to tray by immersion in water at a definitely controlled temperature of approximately 135 F. The foregoing statements apply to the maxillary impression. The mandibular ridge differs from the maxillary in character as to the structures involved and will respond more favorably to slightly harder impression materials if excessively soft ridges are not present.

When soft or cartilaginous ridges are present, the expedient of relieving the

impression over such areas yields the best results. Relief of the surface of the maxillary denture covering the harder spots of the median palate area is usually desirable, but when a flat vault bordered by soft ridges is present, better results are frequently obtained by omitting the relief. This is due to the mechanical advantage gained by distributing the stress applied to the denture to the only tissue remaining capable of sustaining it. In passing from this subject, I must commend to you the fascinating and instructive slides of sections of the edentulous mouth, prepared in the laboratories of the Chicago College of Dentistry, under the direction of E. C. Pendleton.

Experience with cast materials leads me to issue the warning that all artificial stones are not used in the vulcanizer. The stones especially designed for use in the vulcanizer yield the best results. Especially would I recommend Kerr's No. 5 vulcanizing stone, and, in preference to most other stones, I should use snow white plaster No. 1. Stones entirely suitable for construction of metal cases may be generally unsatisfactory for use in the vulcanizer, expanding or otherwise becoming distorted in the presence of moisture or heat. The base used for trial dentures is the key to success or outright failure in recording relations of mandible to maxilla for reproduction in an articulator. Bases of wax are useless. Most of the shellac or plastic bases available today are useless for this purpose. They are so easy working that they flow under mouth temperature and stress and so become inaccurate. Recently, I have used the method of Dr. Hooper, casting a fusible metal base either directly to the cast or from a wax pattern of 20-gage wax adjusted to the cast when the contour of the cast prevents drawing the metal base after casting. Obviously, undercuts are avoided. The space in the tray periphery so left may later be closed with wax for purposes of retention.

Dr. Brenner suggests dusting the cast and the tray surface of the plaster part of the mold with powered lycopodium to facilitate separation of tray from cast. This method obviates the warping of the denture base, often encountered when a vulcanite base that is incorporated in the finished denture is used. If shellac bases are used for securing jaw relations, they must be liberally reinforced with wire stiffeners and carefully checked for accuracy all through the stages of their use. A base that does not fit the cast cannot fit the mouth. The result is that records made with an ill-fitting trial base reflect possible shifting of the bases during record making, as well as the change in relation of mandible to maxilla.

From the point of view of resulting appearance, the shaping of properly chosen artificial teeth to imitate the exact form of the lost natural teeth is the highest form of art in the construction of artificial dentures. The imitation of surface markings with stains protected by glaze is an important accessory to this form of imitation. Whatever the source of the mental reaction is I do not know, but many patients have a definite aversion to disclosing the fact that they have been obliged to part with their natural teeth. To such patients, faithful duplication of the appearance of the natural teeth is a source of great pleasure and comfort. Occasionally, we meet the reverse attitude. The patient desires to be rid of his or her old appearance and start anew with a more pleasing effect. Here, a slight change of size of tooth or hue may serve to satisfy, but usually the easiest way of handling this situation is to agree with the patient verbally, and mentally resolve to, as far as possible, incorporate in the restoration the broad general char-

acteristics of tooth relation and arch form of the natural dentition.

When records of the patient's original teeth are not available, an old picture, or the dentition of a blood relative—son, daughter, brother or sister, may furnish the key to a satisfactory solution of this problem. In any case, the final okeh of the patient to one's efforts is usually more effective if a third person, on whose judgment the patient relies, is present at the final "try in." A close friend or relative is usually more capable of constructive suggestions than is the patient, since our constant companions see more of our teeth in natural speech action than we can ever see. When modifying preextraction appearance, a series of casts of good natural dentitions may be helpful. Harry J. Horner uses a scrapbook full of pictures of celebrities and others. These are all pictures that disclose the teeth. The patient may find a suitable pattern for the operator to follow. These devices are practice builders and time savers. They assure the patient that one is interested in his problems.

In arranging teeth for function, the first step is the proper relating of the respective casts. Two positional relations are involved here: the first, the vertical or bite opening; the second, the horizontal centric or retrusive relation of mandible to maxilla.

The vertical separation of the ridges is the most difficult to definitely describe. When the trial bases are present in the mouth, they should prevent the chin from approaching sufficiently close to the nose to allow the tissues at the corners of the mouth to be collapsed from lack of support. In speech, the flat rims of the trial bases should separate from three-sixteenths to one-sixteenth inch. Excessive opening of the bite should generally be guarded against for it may invite ridge destruction.

Centric or retrusive relation of mandible to maxilla exists when the condyle heads are in their most distal comfortable position in the glenoid fossa.

The rest position of the mandible is that assumed in repose, the teeth separated and mandible usually slightly advanced from the centric or retrusive position.

The rest position of the mandible is associated with the function of speech. It is a valuable position and may or may not correspond with the centric or retruded relation. The centric or retrusive position of the mandible in relation to the maxilla is a position associated with the function of mastication. It is the beginning or the end of a complete masticating stroke. There is no mystery about this relation unless one attempts to register it without some form of a Gysi gothic arch recording device. Stansbery's modification of the Gysi device is an excellent one.

The mandible, with its associated muscles, constitutes the motor part of the mechanism of mastication. The teeth are the cutting tools. When the natural cutting tools have been lost, new ones or artificial tools have to be inserted in the mechanism if function is to continue. These substitute cutting tools cannot be anchored as are the original ones and hence must be so related to one another and to the mechanism in which they set that the whole apparatus can work in harmony with a minimum of effort and a minimum displacement of either artificial denture. So called "balancing of occlusion" is nothing more than a means of harmonizing functioning tooth surfaces with the facts governing the movement of the motor mechanism of the mandible. Intelligent application of the principles of so-called "balancing of occlusion" results in removing from the opposing tooth surfaces such prominences as

would hamper the muscles of mastication in pursuing their natural function in their individualized habitual way. "Balancing occlusion" is another way of saying "removing cusp interference." It is an essential and valuable part of the real science of the last stage of restorative dentistry. If the effect, heretofore known as balanced occlusion, is not incorporated in denture design, the patient is prevented from the free use of the mandible in a natural way and is obliged to learn to restrict his jaw movements to avoid the interfering contacts which produce denture movement and resulting soreness. Probably most patients, especially the young, can learn to restrict the jaw movements; hence, almost every kind of instrument can be used in making artificial teeth, and some patient or patients can be found who will, by using teeth made on it, prove that the instrument works. It takes a long time and a lot of failures on the part of many dentists to prove ultimately that the instrument is not so good as its author thought. This has happened and is happening today. It is quite difficult, it seems, for the human mind to distinguish between the actual truth respecting a thing or an idea, and what some enthusiast may have mistaken for the truth. So I shall not say much more about this subject, except to express it as my humble suspicion that perhaps the Gysi simplex is a fair average articulator, even better than some more complicated ones which do not do what they are supposed to do. Next, of those commercially available, I would place the Hanau Model H, the Gysi trubyte, the old Gysi adaptable, the Hall three dimensional, the Stansbery dental orient and, last and at the top of the list, the Stansbery dental tripod. The last mentioned instruments are considered the better designed to meet all requirements.

I should say that, in mounting casts on an articulator, the facebow is not an absolutely indispensable device, if one does not change the bite opening or does not care whether cusp interference exists in the finished dentures in the mouth. If one does desire the best possible result, the facebow is valuable. It orientates the casts in an articulator in a way that definitely assists in reducing guesswork or error.

In arranging teeth for function, probably the most important departure from normal tooth relation necessary is the arrangement of the six lower anterior teeth so that they do not make contact with the anterior upper teeth in centric relation and preferably also in incisive and lateral positions. If the anterior teeth are free, the posterior can function better.

In arranging teeth, it frequently happens that an inspection of the trial dentures in the mouth indicates the desirability of altering the denture space between the casts by bringing the casts closer together or by increasing the distance between them. When this is done, by raising or lowering the incisor pin of the articulator, a new record of centric relation of mandible to maxilla should always be made at the new bite opening, and the lower cast remounted to this new relation. Serious discrepancies, which cannot always be detected by the eye, may occur if the bite is opened or closed without relocating the lower cast correctly.

In addition to the desirability of a harmonious relation of the masticating surfaces of the teeth of artificial dentures to the motor mechanism of mastication, we have to recognize the importance of other relations of teeth to other structures. If these relations are valued and harmonized, end-results will be gratify-

ing. I refer to the relation of teeth to ridge and of teeth to cheek and lip, and the relation of teeth to tongue. In the main, these three relations can be most closely observed in respect to the lower denture. A study of this problem indicates that when the tongue is at rest—and how difficult sometimes to find it so—the dorsal surface of the tongue is everywhere above the level of the occluso-incisal curve of the lower teeth. This condition must be simulated in artificial teeth. Observe the tongue-to-tooth relation in the lower trial denture when the patient opens the mouth slightly and says, "Thaw."

Next, the tongue on one side, and the cheek and lip on the other, form the lateral boundaries of a cavity in which the molar, bicuspid and anterior teeth are lodged. This is neutral ground. Here, the teeth must be placed. If so placed, they will usually be located definitely upon the lower ridge.

The placing of the teeth of the lower denture *upon* the ridge, or, if anything, toward the lingual aspect of the ridge, is an old expedient to stabilize the lower denture. By this device, the thrust of mastication is transmitted to the entire ridge. Placing the lower molars and bicuspids so that the occlusal surfaces of these teeth are slightly below the projecting angle of the sides of the tongue minimizes the chance interference between the tongue and lingual molar and bicuspid cusps placed slightly toward the lingual aspect of the lower ridge. If the tongue is very broad, one must be careful not to let the lingual surface of the molars project into the tongue space beyond a perpendicular line passing tangentially to the lingual flange of the lower denture. This is especially true of the second molars. If the tongue, when protruded out of the mouth, appears to be narrow and pointed, the second molar may be placed nearer the middle of the mouth without much danger of tongue action in speech dislodging the lower denture.

The teeth of the upper denture, especially the bicuspids, cannot always be placed as far toward the median line of the mouth as mechanics might suggest, as this arrangement produces an ungraceful contracting of the arch that allows the lip over this region to fall in, disturbing the facial contour. Occasionally, this contraction can be overcome by using a 133 L mold, which has a broad bicuspid. By a little care in grinding, this mold can be substituted for a 32 or 30 upper and used with a 32 or 30 lower, which, because of their narrower occlusal surface, require less masticating stress.

The length of the maxillary incisors for such cases as are presented without preextraction records may be approximated when it is understood that these teeth normally touch the lower lip lightly in pronouncing "f" and "v." The prominence of these teeth may also be checked by the relation of the tongue to them in pronouncing the "th" sound as in "thick." The tongue should make contact with the linguo-incisal surface of the incisors in this action.

The choice of materials from which to build dentures is very wide, but the most practical and serviceable material of low cost yet produced is vulcanite.

Metal bases, when accurately fitted, are more comfortable for some people, although others are sensitive to their weight. Such bases are more practical for young patients than for old. It is not generally recognized, but it is a fact, that the weight of artificial dentures does of itself cause atrophy of the supporting ridges. Especially does this apply to the lower. I am certain that only the lightest possible appliance should be put against

the lower ridges of most persons over 40. I wish that I could show you some of the pathetic dental cripples that I have seen, persons whose hopelessly deformed lower ridges are associated with the use of extremely heavy partial dentures or of weighted full lowers.

The silver electro base in combination with phenol-resin plastics affords the nearest approach to perfection of fit that I have ever seen. The silver base should be made quite thick and be well reinforced and braced if the patient has a heavy bite, if splitting of the condensite is to be avoided.

Continuous gum is beyond question the most beautiful dental creation to look at, but here again I believe its use should be confined to the upper, for most cases, and its use for old persons whose ridges may be injured by its weight is to be looked on with suspicion.

Of the plastics other than vulcanite, the best that can be said is that they are all in the experimental stage, especially the newer ones. These materials fall into two classes: those that are softened by heat and pressed to shape, such as celluloid, and those that are hardened from a powder or semiplastic form, such as "iteco" or "glycene." The first class will prove to be absolutely unreliable because they are all likely to change toward the original form before pressing, under the temperature and stress conditions to which dentures are subjected. The other materials are more or less in the development stage. I think reliable, experienced manufacturers should be looked to for these materials. There are a score or more of them on the market, but only two or three are worthy of even experimental use. In their use, I would suggest that you make haste slowly.

All that skill and art may do can be offset in the flasking and finishing of dentures. Flasks should be zealously kept in the condition of precision and accuracy which they exhibit when new. In speaking of the more expensive flasks, for the cheap ones are useless and a curse, I should say that to select a laboratory, if one is used, the dentist should visit the ones available and inspect the flasks used. If the flasks are covered with hammer marks and show play between ring and cup sections, beware! The metal of the sections should be in stable contact when the flask is poured and also when the flask is removed from the vulcanizer. Only one who has experimented with accurate means of checking discrepancies, caused by careless flasking or the use of decrepit flasks, can realize how much time is wasted by dentists grinding out errors that should never have occurred.

Vulcanite should be cured at not over 300 degrees (F.) inside vulcanizer temperature—285 degrees for approximately five hours will yield better results than the usual 320 degrees, which is really 335 or 340 degrees. In fact, rubber is a resin related to the phenol-resins chemically and could be cured at 265 or 270 degrees if enough time were allowed. The lower temperature gives a denser material, which does not misplace teeth so much because of the narrower range of expansion.

The curing and pressing of other plastics is a matter requiring extreme care, A degree or two difference in temperature or a few minutes extra time under heat may seriously affect the strength and color of these materials. If a vulcanizer thermometer is used, it should be checked against an accurate certified thermometer. It may be surprising to find out how inaccurate some vulcanizer thermometers can be.

When the dentures are placed in the mouth, if a Stansbery dental tripod is

used, little adjusting of occlusion will be necessary. The Stansbery technic requires that the casts be keyed and soaped before mounting in the articulator, so that they may be removed from the plaster attachment to the articulator bows intact and be reseated. After vulcanization, the casts and dentures are carefully removed from the flask. Each denture is left on the cast and the cast is preserved intact. When the casts have dried, they are seated on the keyed plaster bases in the articulator and discrepancies occurring in vulcanization are eliminated by grinding. This all occurs before cleaning and finishing the dentures.

With the Hanau or other articulators, there may be discrepancies in contact because the grinding does not necessarily have to be finished before the dentures are inserted in the mouth. If the dentures are free of surface roughness and not visibly overextended, there is little that can be done at the first sitting except to see that the two sets contact uniformly, or nearly so, in centric relation. We then dismiss the patient and instruct him not to attempt to eat with the dentures until after the second visit, twenty-four or forty-eight hours later. This obviates complaints from this source for forty-eight hours at least. Before the patient is dismissed, he should be instructed as to how to cleanse the dentures and when. Also, he should be instructed to wear the dentures constantly for the twenty-four hour period, except at meal times. This will disclose any irritation due to overextension or warpage of the denture base, which may be relieved without the possible added complication caused by cusp interference.

When the patient comes in for the second sitting, peripheral irritation from overextension may be found, and, if it is present, the denture shape should be modified accordingly. Irritation under the denture base should not be relieved until it is certain that it is not caused by cusp interference. The dentures now having settled, this may be disclosed by the process of remounting in an articulator by checkbites.

A small quantity of compound or "aluwax" is placed on the occlusal surface of the upper or lower first and second bicuspids and first molars. The patient is then asked to close lightly upon the soft mass in centric. Care must be exercised to see that the mandible is not protruded. The visible relation of the upper and lower cuspids is usually a satisfactory guide if proper precautions have been observed in the denture construction to obtain centric relation. If compound is used, the entire denture, carrying the compound, may be immersed in the water bath of a thermostatically controlled heater, held at about 130 degrees, for three or four minutes. This insures uniform softening of the compound and facilitates getting equal pressure on the right and left ridges. The denture carrying the wax or compound checkbite is removed and chilled and the excess trimmed off. The denture is replaced in the mouth and the patient is asked to open and close on it in centric relation. If the opposing teeth while close to contact have not yet punctured the compound, and if the test closures show that the upper denture does not move horizontally or vertically, i. e., hits evenly all around on closure, the pressure equalization on the two dentures is correct. (The cases may now be remounted on the original articulator by means of a matrix of the occlusal cusps of the upper denture on a plaster block attached to the lower bow of the same. This preparation is made before the finished waxed upper is removed from the articulator for

flasking). The checkbite just taken is the index of the relation of the lower to the upper for remounting the lower.

After the checkbite is removed, rose madder oil paint, diluted with oil of sweet almond, is painted evenly over the occlusal surface of either denture, and isolated spots making premature contact may be located by the transfer of pigment to the surfaces of the unpainted teeth. These contacts should be relieved. If much alteration is necessary, it is desirable that the grinding be done half on the lower and half on the upper, by wiping clean the surfaces first painted and painting the opposing surfaces on the other denture.

When the case is hitting evenly on the articulator, it is cleansed and returned to the mouth, where it should appear to hit evenly and sound as if it did so. This being the case, if an examination of the occlusion in protrusive and lateral excursions shows no gross interference, carborundum paste may be placed on the morsal surfaces of the teeth and the patient allowed to chew from protrusive to retrusive or centric relation until the surfaces glide smoothly. Then chewing on the right in lateral and the left in lateral excursion is carried through. Care must be exercised to see that abrasive is present on all wearing surfaces, and that the grinding, which is accomplished with but light pressure, is not carried farther than necessary. Gross errors in occlusion may be ground out in the articulator to its original setting after the dentures are satisfactorily relieved to equalize contact in centric occlusion. Sharp occlusal margins are smoothed away and the patient is dismissed, being instructed to commence practice in eating with the dentures. Note the word "practice." Suggest that he chew slowly and on small morsels until the tongue and cheek have learned to coordinate with the new chewing surfaces in their new location.

At the third adjustment sitting, the relief of sore spots, if present at the periphery or tuberosities or in the retromolar area, may be continued. The occlusion is examined. If sore spots under the dentures, especially the lingual bicuspid area of the lower or the disto-incisopalatal areas, are present, this may indicate premature contact, usually in the second molar areas. This should be relieved because it is causing the upper or lower denture to drift forward. This may mean check-bites and remounting in the articulator again.

The source of obscure sore areas may be located by covering the suspected area on the denture with a paste, made by incorporating zinc oxide in petrolatum to a stiff consistency. The paste is gone over with a solution of liquid soap to prevent its sticking to the mucosa on the removal of the denture. A solution made of tooth paste of high soap content in water is excellent for this purpose. The patient is required to close the two dentures, release pressure and reapply it several times. On removal of the denture, the offending area will have punctured the paste and, being visible, can be relieved.

In making adjustments for soreness, it is usually wiser to proceed on the assumption that irritation under new dentures is produced by the manner in which the teeth occlude, it being at variance with the habitual manner of using the mandible, and to look for the trouble as arising in tooth interference first and as arising in equalities of shape or warpage of the denture base secondly.

The length of life of dentures is a matter that comes up to plague us occasionally. The practical, useful life of dentures made from one and a half to two years after extraction may be be-

tween 3 and 7 years. We have all heard of, but seldom seen, the patient who has worn teeth for twenty years or more without trouble. I do not think we need to be unduly disturbed about such statements. Such occasional patients merely serve to illustrate the fact that patients differ very widely in what they demand of dentures and in the manner in which the tissues of the mouth react to the presence of dentures. The longevity of useful service of dentures is traceable to these two controlling conditions, plus possibly a third, i. e., that the removal of teeth that are losing their bony supports owing to disintegration incidental to infection does not alter the fact that the bone left may be so saturated with infection that it cannot all be eliminated, or that the presence of the infection has produced a degeneration in the structures on which the bone depends for its vitality; which materially weakens its ability to withstand the stress of mastication under the most favorable conditions. I am rather certain that from all viewpoints of patient and dentist, the early extraction of teeth that must inevitably be lost is a great trouble saver. When the bone that is supporting infected teeth becomes involved, it becomes more weakened as time goes on. The inevitable result of this in many instances is prolonged trouble in the early years of denture experience, if not in all years of such experience.

Dentures made for young patients whose vitality is unimpaired are, and always must be, more successful from the point of view of immediate comfort and length of useful service than those made for old persons whose bodily vitality is on the wane and whose oral tissues inevitably reflect such conditions. From tissue reaction to the presence of dentures, I have several times detected diabetes, which subsequent medical examination confirmed and disclosed, although patient and physician had previously been unaware of it. The longer I practice dentistry, the more I am convinced that close cooperation between dentistry and medicine should be the rule, as many of the conditions that cause embarrassment in dental treatment arise from conditions under the care of the physician.

RESTORING FUNCTIONAL BALANCE OF THE MASTICATORY SURFACE WHERE TEETH HAVE MIGRATED*

By B. F. SAPIENZA, D.D.S., Birmingham, Ala.

AMONG the more serious mistakes of the dental profession are these two: 1. We extract permanent teeth from young patients and make no provision for the retention of the space thus created. (Fig. 1.) 2. Years later, after the teeth have drifted until the space is so diminished that bridging it is apparently unnecessary (Fig. 2), most of us cover our original mistake by blandly saying to the patient, "No bridge is needed." We fail to add: "There will be loss of contact, food impaction, breaking down of the supporting structures, periodontoclasia and other abnormal conditions of the masticatory apparatus." We cover the original mistake by this evasion—provided there is not already loss of contact, food impaction, etc.

The teeth adjoining the space created by the early loss of the lower first molar are the most common offenders. This paper, therefore, will concern itself chiefly with these teeth and with the restoration best suited for bridging the gap which we, through our original failure to send the patient to an orthodontist for a retaining appliance, have allowed to diminish until an ordinary bridge is no longer possible.

Years after the lower first molar has been extracted, and no retaining appliance has been placed, the usual condition is that the lower second molar drifts mesially and lingually out of occlusion. The second bicuspid, in most cases, is in torsoclusion. (Fig. 3, left.) Frequently, too, there is loss of contact between the first and second bicuspids, and between the second and third molars, elongation of opposing teeth and other abnormal conditions.

An examination of more than 400 cases, and an observation of approximately 100 study models, have revealed that, when the second molar begins to drift and the second bicuspid is normal, a minimum of four teeth are thrown out of occlusion.

When the second molar begins to drift and the second bicuspid has rotated, a minimum of five teeth are thrown out of occlusion. (Fig. 4, above.) Occasionally, the early loss of the lower first molar results in an abnormal occlusion of the entire half of the masticatory apparatus involved. (Fig. 5.)

It has been common practice to neglect these cases; which may be due to the fact that no specific method of restoration has as yet been suggested; or, if it has, I have not heard of it.

This paper, therefore, will discuss the construction of a dummyless fixed bridge, with full cast crown abutments, which

*Read before the Section on Partial Denture Prosthesis at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 14, 1932.

I have used with apparent success for seven years. (Figs. 6-7.)

It is my earnest contention that a roentgenogram and a study model of each case are essential before operation is begun. Roentgenograms, if correctly made, will reveal the position of pulps, the length of roots, the density of bone and the condition of the supporting structures. A study model will assist in determining the amount of reparation necessary to obtain balance.

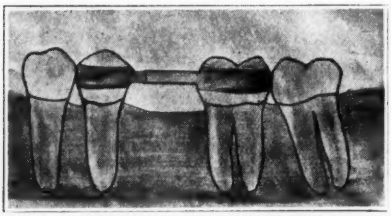

Fig. 1.—Post and tube type retaining appliance recommended after early extraction of permanent teeth, making it possible to obtain physiologic tooth movement and at same time prevent rambling of teeth out of position.

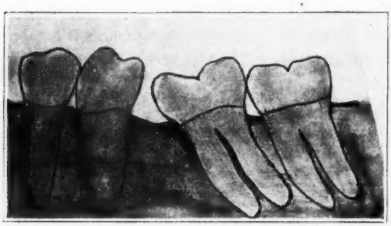

Fig. 2.—Result of original failure to use space-retaining appliance.

After the roentgenogram and the study model are made, the operator reduces any opposing teeth that may have become elongated. This reduction of elongated teeth is absolutely necessary, because teeth that are not in functional occlusion are of no value to the masticatory apparatus. Even though the operator encounters sensitive dentin and is therefore forced to restore the occlusal surface, he must not desist until the elongated tooth has been so reduced that a balance with the adjoining teeth is obtained. (Fig. 8, above.) If a tooth cannot be placed in correct occlusion, it should be extracted and replaced with a bridge. (Fig. 9.)

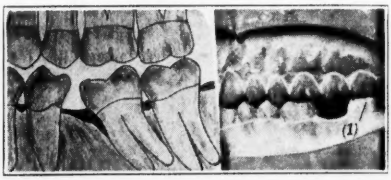

Fig. 3.—Left: Second bicuspid in torsoclusion and second molar drifting mesially and lingually out of position, with result that minimum of four teeth are out of occlusion. Right: Case of missing lower second molar in which occlusion is apparently normal. Only two teeth are out of occlusion, the lower second molar and the opposing upper second molar. When the third molar (*1*) begins to drift, practically four teeth are out of occlusion: the upper second and third molar, lower third molar and the missing second molar.

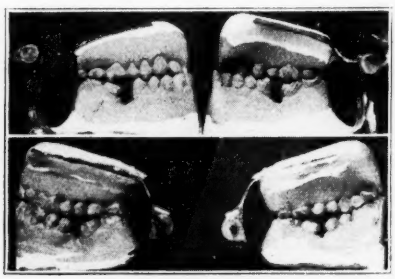

Fig. 4.—Above: Buccal and lingual view of case showing minimum of five teeth thrown out of occlusion owing to early loss of lower first molar. Below: Buccal and lingual view of case showing minimum of six teeth thrown out of occlusion owing to early loss of lower first molar.

It is better to obtain functional oc-

clusion by means of a proper restoration than to have an abnormal occlusion eventually causing a pathologic condition. (Fig. 9.)

The elongation of opposing teeth having been corrected, abutment preparations are begun. I have found it best first to prepare the second bicuspid, then to reduce the mesial and lingual surface areas of the second molar sufficiently to obtain an adequate anchorage and a definite finishing line. In this reduction,

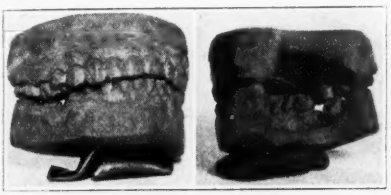

Fig. 5.—Buccal and lingual view of case showing abnormality of entire half of masticatory apparatus due to early loss of lower first molar.

Fig. 6.—Minimum of six teeth placed in functional occlusion by construction of dummyless fixed bridge, with full cast crown abutments on lower second bicuspid and lower second molar, then soldering contact forming bridge without dummy.

it is necessary to keep the molar areas parallel with the bicuspid areas. Continuing, the operator reduces the distal, distoclusal and buccal surface areas. (Fig. 8, below, left, and Fig. 10.)

These prepared areas should, of course, be protected. I prefer the use of aluminum shells of correct size, contoured to the gum margin and affixed with car-

Fig. 7.—Above: Full cast crowns in position before contact area is soldered. Center (three views): Dummyless bridges completed and cemented to place. Below: Result of extending contact area on leaning second molar.

bol-eugenol mixed to a putty-like consistency. (Fig 11.) During the construction of the bridge, the shells may be

removed and replaced whenever the operator deems it desirable. Their use must be continued until the bridge is ready to be cemented.

With a definite protection of the abutments established, the operator continues by making wax patterns. For the making of these patterns, there is, of course, more than one technic. It is advisable that each operator use the method to which he is accustomed.

In making wax patterns for the particular type bridge here recommended, the operator will realize that he is dealing with teeth in an abnormal position.

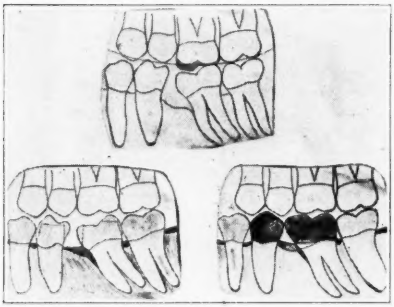

Fig. 8.—Reduction of elongated tooth before abutment preparations for bridge are begun (above). The bicuspid is prepared first (below, left) because, although the crown of the tooth is rotated, the root is usually vertical and therefore nearer normal than the second molar. Below, left, the method of obtaining a normal tooth form by the use of a full cast crown on the bicuspid is illustrated. As shown, functional occlusion is more easily obtained by the use of a full cast crown on the molar.

In the patterns, he will take especial care to create a normal tooth form. The mesial portion of the second molar should be extended until contact is established with the distal portion of the second bicuspid. The completed pattern of the molar will inevitably appear very bulky at the mesioclusal angle. This bulk may be reduced by removing as much wax as is permissible from the inner surface of the angle. The weight of the casting is thereby lessened and, when cemented, will afford added anchorage.

After the patterns are cast and the occlusion is checked, an impression is taken in the usual manner, except that, with the dummyless bridge, an impression of the opposing teeth is not necessary. The bridge, completed by soldering at the contact point of the two crowns, should go to place with finger pressure.

Soldering is absolutely essential. Failure to solder would cause the extended contact portion of the molar restoration to act as a lever, thus gradually driving it out of occlusion when under stress. Furthermore, food impaction distal to the second molar and other abnormal

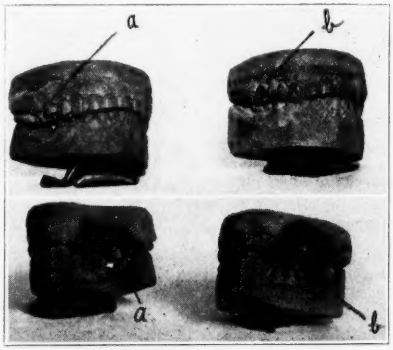

Fig. 9.—Below: Lower second molar (*a*) which has rambled out of position to such an extent that it is of no value to the masticatory apparatus. It was extracted and the area replaced with a fixed bridge (*b*). Above, (*a*): Same case; appearance of jaw before extraction of upper first and second bicuspids and first molar along with lower second molar, which was done because they could not be placed in functional occlusion. Replacement was made by the construction of fixed bridges (*b*), the patient being 38 years of age.

conditions would inevitably follow. (Fig. 13. and Fig. 7, below.)

In building dummyless bridges, I have encountered a particular abnormal condition frequently enough to give it especial consideration. After the abutments are paralleled, the bridge at times will not go to place owing to interference from either the distoclusal angle of the first bicuspid or the mesioclusal angle of the third molar, or both. (Fig. 12, above.) This is due to the fact that the distance from the distoclusal angle of the first bicuspid to the mesioclusal angle of the third molar is less than the distance from the mesiogingival margin of the second bicuspid to the distogingival margin of the second molar. (Fig. 12, below, left.) In dealing with migrating teeth, the operator must expect to meet such interference. When confronted with these conditions, he is forced to reduce the interfering angle and cement the bridge, then restore the angle by construction of a two-surface inlay with proper contact. (Fig. 12, below, right.)

Occasionally, though rarely, after preparations are completed, enough space has been created to insert a dummy instead of building out the contact and soldering. Whenever there is sufficient space to permit the use of a dummy, I urge that it be inserted. I do not contend that the dummyless bridge should in any wise supersede the dummy; I recommend the dummyless bridge only when an ordinary bridge cannot be placed. (Fig. 14.)

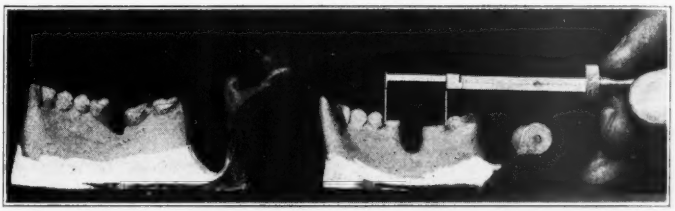

Fig. 10.—Use of parallelometer, essential to dummyless bridge restoration.

Fig. 11.—Aluminum shells used to protect abutment preparations during construction of restoration. The same shells are used until restoration is complete, being removed and replaced as desired by the operator.

There is an incidental recommendation in this paper which I fear may not be immediately accepted. I am asking that the use of full cast crowns as abutments be given unprejudiced consideration. Furthermore, it is my belief that full cast crowns are the only means of restoration that should ever be used in dummyless bridges. This belief is based on two facts, both of which will be recognized instantly as truisms: Whenever the second molar has drifted out of position, the full cast crown will restore functional occlusion more easily than any other means of restoration. (Fig. 8, below, right.) Whenever the second bicuspid has rotated, the full cast crown will restore normal tooth form

more easily than any other means of restoration. (Fig. 8, below, right.)

Many operators will object to the use of full cast crowns, contending that porcelain should be used. I agree that esthetically porcelain is preferable to gold were it only possible to make porcelain fit as accurately as the other restoration medium.

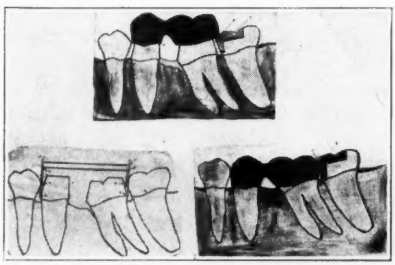

Fig. 12.—Dummyless bridge which will at times fail to go to place because of interference from mesioclusal angle of lower third molar. Below, right, the bridge is shown in position, the interfering angle being corrected by the construction of a two-surface inlay with proper contact.

Unfortunately, there are exceedingly few operators capable of satisfactorily manipulating porcelain. Admitting an inability to use porcelain satisfactorily, the vast majority of us are forced to make use of gold.

I believe that where esthetics is not involved, the full cast crown is infinitely superior to any other form of abutment restoration yet developed. The maximum anchorage is obtained; the preparation is less difficult than that necessary for any other form of abutment; the completed crown affords protection from caries to all surfaces; the necessary preparation is always at a safe distance from the pulp; in the preparation for the full cast crown, destruction is confined to virtually one tissue, the enamel; the average amount of tooth structure destroyed in the preparation is no more than the amount sacrificed in the preparation for a three-quarter crown or a mesioclusodistal

Fig. 14.—Case in which dummyless bridge was started, but after abutment preparations were completed, enough space had been created to insert a dummy.

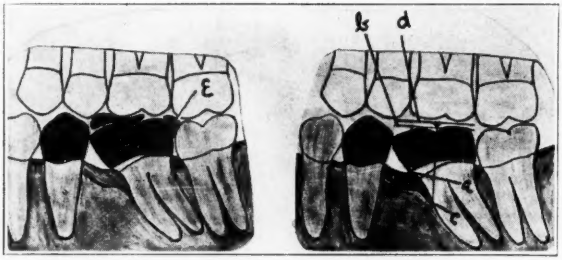

Fig. 13.—Drawing showing that if the fulcrum was at the gum margin (*a*) and stress was applied on the lever arm (*b*), the stress would probably not be sufficient to cause food impaction distally to the second molar immediately. The fulcrum is not at the gum margin (*a*), but at the supporting structure (*c*) and stress applied on the lever arm (*d*) would inevitably cause food impaction and other abnormalities distally to the lower second molar (*e*).

inlay, and the time required for the preparation is less than the time required to prepare for a three-quarter crown or a mesioclusodistal inlay. This saving of time inevitably causes less trauma and less shock to the pulp.

A most important fact, and one perhaps that is not commonly recognized, is that the marginal line necessary to perfect in the full cast crown is approximately one-third less than the marginal line required by the three-quarter crown, and it is at least one-half less than the marginal line required by the mesioclusodistal inlay. (Fig. 15.)

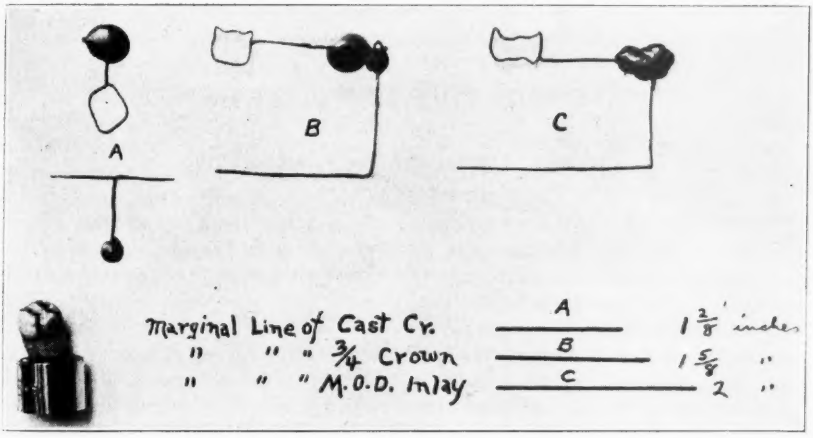

Fig. 15.—Representation of marginal lines of full cast crown, three-quarter crown and mesioclusodistal inlay on molar by means of black grooves. Wire placed in these grooves and then straightened out reveals the different lengths of marginal lines of the above named restorations.

There is yet another form of restoration which some operators will prefer whenever the second bicuspid is in normal occlusion: the two-surface inlay, which undoubtedly conserves tooth structure at the time of the original preparation. Unfortunately, this inlay does not afford protection from caries, and the results of caries attacking a tooth restored by this type of inlay is that, in most cases, the entire bridge must be removed for the damage to be corrected.

The necessary removal of the bridge is, of course, the lesser misfortune that can result from the use of the two-surface inlay; for sometimes a patient, through ignorance, will neglect decay until the pulp is involved, with resulting loss of the tooth. Thus, our original effort to conserve tooth structure acts as a boomerang, with most unfortunate results for the patients and with ultimate harm to your professional prestige.

617 Comer Building

DISCUSSION

Joseph L. Cleveland, Buffalo, N. Y.: Dr. Sapienza has given us an excellent method of overcoming one of the many hazards that confront the crown and bridge operator. This condition is so prevalent, and so varied in its location and extent of torsion and malposition, that, I believe, no one method can be given as the perfect or ideal reconstruction. From my observations, the majority of the

losses of the first molar take place after the second molar has fully erupted and the roots have established their position. Nature endeavors to close this unwanted gap. Unfortunately, the tooth does not move bodily in equal ratio, but the crown tilts toward the space and lingually much more than does the root. The long bell-shaped tooth is the type that gives us the greater trouble. The short bulky type tooth migrates much less, and when it does tilt, so much less tooth structure has to be removed to parallel the abutments that we are usually at a safe distance from the pulp. The long ones are our hazard, and to prepare these for two full cast crown, the bicuspid or the molar or both must suffer much loss of enamel and dentin, and, in many cases, the paralleling process cannot be accomplished without cutting directly through the pulp chamber. While I fully realize the lesser cavosurface margin of the full cast crown with its protection of the self-cleansing area of the gum tissue in comparison to that of the three-quarter crown with its greater exposed margins, I prefer to use the latter. The three-quarter crown placed on lingually inclined lower molars requires the least amount of tooth structure destruction if the preparation is made on the buccal instead of the lingual aspect. This eliminates the radical cutting of the lingual and mesiolingual surfaces, thus protecting the all important vitality of these teeth.

OPERATIVE DENTISTRY*

By R. W. RULE, D.D.S., San Francisco, Calif.

DENTISTRY has had its epochs—its periods that were marked by special advancement in certain of its phases. As in history, times have been characterized and nations molded by the dominant influence of the men who have been their leaders for good or ill, so in dentistry the very lives of the great and noble men who have held place in its ranks have been the power that has shaped its developments.

At times, perhaps the converse of this has been true, in that the exigencies of the hour have called forth the genius of those who could hold the helm and guide the ship safely on its course.

Modern dentistry in the United States may be said to have had its beginning about one hundred years ago, with the initiation of organized plans for education through the college, the journal and the society. It may be roughly divided into two main branches: operative dentistry, which aims to conserve the natural teeth; and prosthetic dentistry, which deals with the restoration of that which is lost; with, coming in between, that important subsidiary branch, oral surgery, which is concerned largely with the removal of those teeth too badly diseased to be of further service. These branches have been subdivided into a number of more or less distinct sections or specialties.

In the early days before it could be called an art or a profession, dentistry consisted chiefly of a crude and often brutal surgery. During the latter part of the eighteenth and first half of the nineteenth centuries, operative and prosthetic dentistry were in their formative periods, with operative dentistry rapidly assuming the ascendency during the middle of the last century, under the leader-

*Read before the Texas State Dental Society, Dallas, May 17, 1932.

ship of such men as Hayden, Hudsen, Varney and Webb. Thousands of men have added each his share to its progress, but especially during the earlier days when the aggregate number of those in the profession was small, the names of a few stand out prominently as giving character to its development. With the advance in dental education, gradually its practice was placed on a more scientific basis and its ranks were rapidly augmented.

In the science of dentistry, and particularly operative dentistry, the work of G. V. Black and W. D. Miller was epochal, leaving its impress on the practice of dentistry for all time. This is more noteworthy because of the fact that they had so little to work with, and while, during the last quarter century, research and knowledge have bounded forward, our modern workers have built largely upon the foundation laid for them by the pioneers, including those in the medical sciences.

In the practice of operative dentistry, unquestionably great developments centered around the progress in the technic of filling teeth with gold. The efforts to save teeth with lead fillings, tin fillings and even the early amalgam fillings were not very successful, but the ingenuity of many operators developed a skill in the technic of using gold foil that, coupled with the natural properties which make it so suitable for this purpose, resulted in fillings of permanency. Nothing has ever surpassed or even equaled it in this respect.

Many other facts, such as the introduction of the rubber dam, the improvement of amalgam alloys and the development of root canal work, helped to make operative dentistry the chief concern of the average dentist. It was generally considered in the first rank of importance until more recent years.

With the advent of the casting process in dentistry and, a little later, the furor over focal infection, marked changes began to occur. The cast inlay, in a short time, largely displaced the gold foil filling, though it can never rightly take its place. The casting process also stimulated crown and bridge work very markedly. Then came the realization that, in saving teeth by root canal therapy and filling, we were, in many instances, subjecting the patients to results worse than would have developed through the loss of the teeth. The pendulum swung the other way, and oral surgery stepped in to claim for a few years the attention of the profession. The natural sequence of this situation created a great demand for better plate denture service, both full and partial.

Meanwhile, orthodontic science and practice had been gradually working its way along and, with dentistry elevated to a place of importance in the eyes of both the medical profession and the public, and more thought being given to the welfare of the child, the consideration of dentofacial deformities and their correction has brought the orthodontist and his work distinctly to the front.

These considerations seem to account for the rather generally recognized fact that operative dentistry has not continued to hold the lead or place of prominence that it once had. This has been manifested, too, in our dental literature and has been commented on by our leading writers.

C. N. Johnson wrote, in 1926:

> In recent years, this most essential department of dental practice has suffered something of an eclipse in the professional mind, a fact which is apparent when we study the periodical literature of the day. . . . There are two chief reasons for the apparent lack of

interest in the subject of operative dentistry during recent times. One is the fact that the attention of the profession has been concentrated on other subjects which have been brought to the front by the wave of interest in focal infection and all of its allied consequences. The highest function of operative dentistry is to save the natural teeth; while the result of so pronounced a concentration on the dangers of focal infection has tended straightway to the elimination of the natural teeth . . . in some of its aspects it (operative dentistry) contains the germ of the real hope of the profession in the highest service of humanity, and the attention of the profession must never be diverted from it.

There seems just now a tendency to swing back to a saner basis of practice, while research is pointing the way to a better knowledge and its application in all branches of dentistry.

Much has been done toward the improvement of inlay technic, especially in the matter of producing better castings through the control of shrinkage of the gold either by heat expansion of the investment material or by expansion of the wax pattern, or a combination of both. Also, for some years, the number of men who realize the mistake made in giving up the use of gold foil as a filling material has increased, and they are beginning to give it its rightful place again. There are therefore some indications of a return of interest in the distinctly operative field, although the tendency to specialization and the attraction of the spectacular has helped to make men forget the basic importance of general operative procedure.

In consideration of the present status of operative dentistry, I desire to point out the importance of three phases of this field: preventive dentistry, oral diagnosis and operative efficiency.

PREVENTIVE DENTISTRY

Let me make it clear that I do not use the term "preventive dentistry" in a restricted sense. In a given group, we will find almost as many conceptions of its meaning and application as there are men in the group. This very fact tends to make it anybody's business, and perhaps therefore nobody's responsibility. The idea of preventive dentistry is not new; in fact, it is very old. Some of the early views concerning it, though sound in principle, were never carried out widely enough to make them very effective.

In modern times, the subject has come to have many phases. Research has been undertaken along a number of lines and has brought out some new facts, as well as establishing a scientific basis for some of the former empiric views.

The point I wish to make is that the knowledge we have, which in the aggregate is no inconsiderable amount, is scattered and unapplied. The man at the chair is not thinking it or talking it or using it in his daily work. It does not even occur to him that a suitable presentation of it to his patients and application of it in his work are at once the best service he can render to his patient and one of the best means he can take to build a practice and establish himself in it.

The very best patients in one's practice are those who have been taught to realize the value of preventive measures, both those which they can apply themselves and those which may be employed in service to them. In addition, those whom they refer for a like service become the same type of patient. Many cases could be cited of patients who have been carried over periods of from fifteen to twenty years and longer with practically no disease of the mouth and teeth simply because of employment of such measures and such service; and there seems no reason that this condition

should not continue through the remainder of their lives.

Prevention in dentistry is basic and fundamental in importance, and as far as we fail to make use of its known principles in our work, we fail to rise to the heights of our privileges and responsibilities.

Following are a few of the many ramifications of this important subject which the dentist may consider.

First, let us remember that, since the mouth and its condition gives an excellent index of the general systemic condition, the dentist is in a position to detect the earliest symptoms of disease and refer the patient for medical attention. The possibilities for prevention in this line are far reaching in importance, but will be utilized only by those who are awake to the fact that they may at times render an important service in this way. The consideration of this comes more properly under the subject of oral diagnosis.

Secondly, the prospective mother may be advised as to diet and hygienic care and given such treatment as will help to prevent the loss of her own teeth during the periods of gestation and lactation and also assure the nutrition necessary to build sound teeth in the unborn and the nursing child. It may be objected that this is the work of the physician or pediatrician. Very well, let the patient be referred to him, but if the latter lacks the interest or the knowledge to give this help, why should not we be prepared to give it? There is need for a closer cooperation between the physician and dentist along this line and in oral diagnosis.

We come now to the question of the young child, and here doubtless we should center and concentrate our efforts, for, as Millberry has pointed out, our aim should be to carry our patients through life from childhood to old age with a full complement of teeth in good condition and capable of normal function. To do this, surely we must learn to prevent rather than to cure the ravages of disease, or fail in our objective and have to resort to substitutes for the natural teeth. This means that we must begin with the infant by laying a foundation for sound teeth in a sound body by proper nutrition and general hygienic and health measures. As far as the period of infancy is concerned, this is the physician's work, and to his credit be it said that conditions are greatly improving. Still, it may often fall to our lot to preach the gospel of dental health to the parents of these young children and to help to educate them to its importance. It is too much to expect that we shall overcome the results of the neglect and ignorance of many generations in a few short months or years, and we will need to keep working along similar lines, over long periods, and some of these children who have secured a good start, and many others who have not, will come to us presenting conditions which claim a most important place in this field of early preventive dentistry, conditions belonging to a specialty coming not strictly under operative dentistry but very closely allied to it; i. e., orthodontia.

Lischer says:

> In our second annual report (St. Louis, 1931), we called attention to the high incidence of dental anomalies among children. The gradual dissemination of the benefits of orthodontic service and of the basic function it fulfills in the scientific care of children's teeth is creating a widespread and ever-growing demand for orthodontic treatment in every community. The manner in which this demand is generally met constitutes the major fault of orthodontic education. The causal relationship between dental anomalies during childhood and denture mutilations and extensive or total loss of teeth in later adult life is also gaining rapid acceptance. Orthodontists have generally adopted this

truth as a primary purpose of all treatments. Thus, the entire program of preventive dentistry and of child welfare is largely contingent on a vast extension of orthodontic therapy to the young. In other words, it is evident that the ills of dental mutilations and edentulous old age can be more effectively mitigated if dental orthopedic service is provided for all children.

This naturally raises the question of the present inadequacy of education in this branch of dentistry to enable the profession to cope with the situation as it exists. The trained specialist is to be found only in the large centers of population, and even there he cannot cover the ground while there are countless numbers of children in the small cities and country towns needing this service; yet the general practitioner has not had the training to warrant his undertaking it.

To meet this situation, and in an earnest effort to solve the problem, the University of California has undertaken to test a new plan in orthodontic education, offering the undergraduate student who wishes to major in orthodontics in lieu of prosthetic dentistry an opportunity to do so, and thus acquire a thorough foundational training in this branch without devoting more than the usual four years' time to the study of dental subjects. This is called curriculum II. Curriculum I is the regular dental course giving eighty hours of work in orthodontics. Under curriculum II, the student is expected to take a minimum of 244 hours of dental technic, but is required to take the full course in operative dentistry and auxiliary subjects, with a course in orthodontics equal to that of operative dentistry. This covers a broad and well laid out program for orthodontic education and is the equivalent of a full year or more of postgraduate training. It is felt that the young man thus prepared who locates in one of the smaller cities or towns is better equipped to take care of the children in his practice and can render his community a higher service than those who are graduated under curriculum I.

With this digression in education, we return now to our subject. Time allows of mere mention of a few other important things in preventive dentistry such as:

1. Very careful and thorough examination and oral prophylaxis for each new patient, and painstaking instruction as to brushing and caring for the mouth, with demonstrations of brushing technic and follow-up, to be sure that instruction has been understood correctly and is being carried out in practice. We must show interest and enthusiasm in this if we expect to awaken interest in the patient and secure cooperation.

2. Examination and oral prophylaxis of all patients, as frequently as seems necessary to control conditions. This is comparable to practice in medicine today which is spoken of as health supervision.

3. Early detection of caries.

4. Early correction of structural defects, such as pits and fissures and other hypoplastic areas, frequently filling these even before caries has actually started, though a sane attitude and practice in this regard should ever be maintained.

5. The practice of extension for immunity in cavity preparation.

6. The use of the rubber dam as routine practice in cavity preparation, with the utmost care as to protection of the freshly cut dentinal tubules when working in sound dentin. How many cases of pulpitis and pulp necrosis could have been prevented by more care in this respect!

7. The exercise of care in finishing fill-

ing operations and other restorations, to perfectly smooth margins in even continuity with tooth surface, in order to prevent injury to the gingival tissues and recurrence of decay through lodgement of food débris and bacterial plaques; building fillings and making restorations to correct anatomic form with tight well-rounded contacts to prevent injury to the septal tissues and paradentium; checking carefully the occlusal form in restorations to avoid injury through overstress.

8. The effort, by every possible means, to keep the pulp in a healthy, vital condition and thus avoid the common sequelae of disease of the pulp and the better dissemination of knowledge in as simple and concrete a form as possible regarding the importance and beneficial effects of a well balanced and simple diet, suitable exercise, sunshine and general hygienic measures.

A word of caution may be necessary lest we forget our limitations and overstep our bounds. In certain disease conditions of the body, dietary prescriptions should be strictly in the hands of the physician. There are conditions in which an ill-advised dietary change may do much harm. Again, there may be conditions of endocrine dysfunction in which dietary changes alone may not produce the effect or beneficial results we would expect in the more normal individual. When such complications are suspected, the patient should be referred to the physician; nor should there be any carelessness on our part in forming a judgment.

ORAL DIAGNOSIS

In the treatment of disease, the first consideration is a scientific determination of what the disease is and a differentiation between it and other diseases with similar symptoms or characteristics.

In many instances, the successful outcome of treatment depends almost entirely on a carefully made, accurate diagnosis at the outset, and grave errors in treatment may result from careless or hasty conclusions or neglect to observe the conditions present.

Next in importance to prevention is a thorough knowledge as to how to diagnose disease as a foundation upon which to base its treatment. The education of the dentist as well as the physician should rest upon a thorough training in those sciences, a knowledge of which will fit him to diagnose accurately. Do we not as a profession, in this country, fall short in this regard? Doubtless we have many good diagnosticians, but the average dentist should give more thought and study to this all-important part of his work. It is my judgment that diagnosis must be made the basis of our work, holding first place in our general practice, if we are to be considered a scientific profession. A consideration of diagnosis under a discussion of operative dentistry does not imply that the orthodontist or the prosthetist does not find it equally important; quite the contrary. But perhaps we have been less ready to recognize its importance. Dentistry in America has advanced during the last fifty years to a remarkable degree of excellence in technic and mechanical perfection, but European countries have gone farther than we in the scientific phases of the science and in research, and it is time that we were getting away from the reputation of being mere technicians. Progress is undoubtedly being made in this direction. Many of the schools are awake to the situation and are doing all they can to correct it, but there is a question as to whether we are not too technically minded and therefore overlook the application of much

valuable knowledge which we already possess.

The awakening to the importance of the subject of focal infection in recent years has given a great stimulus to that particular phase of diagnosis. Many papers have been written about it and the field has been well covered. It is not my subject now, but may I ask if this topic has not been first in the minds of the profession when oral diagnosis has been mentioned? It seems appropriate at this time to call attention to the broad scope of this subject. In a graduate course given at the University of California, about 200 diseases are studied, in connection with their diagnosis. These include those conditions which are commonly called oral diseases and are considered within the dentist's province; others which the dentist will not attempt to treat, but should recognize and refer to the physician or surgeon for treatment, and still others of which only the symptoms will be found in or about the mouth or will be discovered in the course of the examination.

Too often we fail to recognize these diseases or the symptoms which indicate their presence and thus fail to render to the patient the service to which he is entitled. Too often we overlook signs or symptoms of conditions the knowledge of which would be of vital importance to the patient. We need to cultivate not only our powers of observation but the *habit* of observation. We have been accused of seeing only the tooth and not the patient; and too often this has been a just criticism.

A method which is in use at our university and has worked out well during the past year follows a definite outline covering anamnesis, status presens, diagnosis, therapy and prognosis.

The following plan is suggested for procedure and may be reduced or enlarged on according to one's judgment of the needs of the case. An observant glance at the patient as he enters will give one a fair idea of his general health, and a few questions will enable the operator to decide how fully the anamnesis will need to be gone into unless further progress in the examination reveals conditions which the general appearance had not led one to suspect. Charts should be available for recording the findings as we proceed.

DIAGNOSTIC PROCEDURE

We enter on the chart the date, patient's name, address, reference, age, sex, nationality and occupation. Data covering the following are then entered:

1. Anamnesis:
   - A. Family history.
   - B. Personal history.
   - C. Medical record, if available.
   - D. Patient's complaint.
2. Status Presens:
   - A. General impression of condition of patient.
   - B. Extra-oral:
     1. Hair, eyes, color of ears, color and texture of skin and color of lips.
     2. Profile, deviations from normal symmetry.
     3. Scars.
     4. Cervical and submaxillary lymph glands (palpate).
   - C. Intra-oral:
     1. Character of odor of breath, e. g., as in diabetes, Vincent's infection, alcoholism.
     2. Oral examination beginning with:
        - (*a*) Mucous membrane, deviations from normal in color or appearance or presence of growths of any kind, mucous patches, ulcers, inflamed areas, indurations.
        - (*b*) Character and quantity of saliva.
        - (*c*) Tongue, size, coating, patches, markings, color, irritations, warts, leukoplakia, sublingual area.

(*d*) Tonsils, whether enlarged, inflamed, exuding pus or holding cheesy matter in crypts.
(*e*) Uvula, palate, cleft or well formed, narrow, high, broad, low or having irregular form.

3. Gingival and subgingival areas, presence of calculus, pus, inflammatory conditions, edema, hypertrophy, atrophy, indications of metallic poisoning.
4. Teeth examined, one by one for:
(*a*) Caries, hypoplasia, Hutchinson's notches, faulty fillings or other restorations, sharp ragged edges, open interproximal spaces or faulty contacts and areas of food impactions due to foregoing conditions or to lack of marginal ridges and incorrect occlusal form.
(*b*) Fistulas (palpate over root areas for softened spots, painful areas, irregularities).
(*c*) Pulp disease, differentiated from history and present clinical symptoms, using thermal tests, vitality tests or occasionally transillumination to check, if necessary.
(*d*) Tooth mobility (palpate).
(*e*) Anomalies of form, size, position and number of teeth and anomalies of occlusion.
(*f*) Number and location of areas where teeth are missing, whether from previous extractions or noneruption.
5. Roentgenographic examination.
(This is a great aid and at times indispensable. It is only an adjunct and should be used as such. Too great dependence should not be placed on it and conclusions should not be drawn without clinical examination. Moreover, as to detecting cavities, clinical examination will sometimes reveal cavities which do not show in the roentgenogram.)
(*a*) Condition of alveolar bone, especially any marked deviation from normal appearance.
(*b*) Rarefied or condensed areas at apex, root resorption, poorly filled root canals.
(*c*) Fragments of broken root or other foreign bodies.
(*d*) Necrotic areas or sequestra.
(*e*) Impacted teeth or congenital anomalies of number.
(*f*) Sinus involvement and the presence of cysts or other evidence of pathologic involvement.
3. Diagnosis.
(There should be an exact diagnosis. It is based on a discriminative interpretation of the findings in the foregoing routine.)
4. Therapy.
(This can be accurately outlined only when based on an exact diagnosis.)
5. Prognosis.
6. Epicrisis:
A. Report of symptoms and findings following institution of treatment.
B. Study models and record models when deemed advisable.
C. Photographs for record when this is desired. (This is a subject by itself and a most interesting one.)
D. Report of such other laboratory tests as may have been made for the case: bacteriologic tests, blood count, urinalysis, basal metabolism tests, etc.

In sinusitis, temporomandibular arthropathy, hysteria, malignant growths and many other conditions which we may be called on to deal with, there are various diagnostic aids which we cannot give here in detail. One may be governed somewhat in the character and extent of examination by the nature of the case and by whether the patient has come for relief of some acute condition or for general dental examination, or has been referred by a physician for dental diagnosis. It will not be necessary to follow all of this procedure in every case, but much of it should be routine work. One of my principal reasons for dealing with this subject is to try to emphasize the fact that many dentists are constantly overlooking things that should not be overlooked and doing it to the detriment of the patient, themselves and the profes-

sion. Our examinations will often reveal conditions which call for the aid of the physician, and he should be called in for consultation or the patient referred to him, as seems best. Such a cultivation of mutual relationship will help to meet the present need for a better cooperation between the two professions.

Many conditions of paradental disease on the one hand and extreme prevalence of caries on the other indicate general metabolic disturbances, and various laboratory tests may be called for, such as basal metabolism tests, a blood count, urinalysis and bacteriologic tests. These may be made by the physician or by the laboratory technician.

EFFICIENCY IN OPERATIVE DENTISTRY

In commerce and industry, efficiency is the keynote of success. The manager of a factory or office who could not keep his force working on an efficiency basis would soon be replaced by some one who could. In the dental office, the dentist is the manager. The trouble is that we have too many poor managers. In most instances, the manager need not be replaced, but should set for himself a new standard, and work toward it diligently until results are obtained.

The possibilities of a definite system and simplified instrumentation closely followed are very great. To be sure, there is such a thing as getting through quickly by slighting parts of the work. This is to be decried. There are many operators who work rapidly, yet without haste, and whose work is excellent. If their operating is studied, it will be found that either they are naturally clever workers and therefore take the shortest route to a desired end, or else they have been trained or have trained themselves to follow a definite system which has been well thought out.

The latter plan is perfectly feasible for the average operator and should not be considered as limited to the natural expert, although, if followed by the average operator, it will make many more experts. The plan is this: divide each part of the work into definite steps, each step being that part which can be accomplished with one instrument. Visualize the successive steps necessary for the given operation, keeping the number to a minimum, and lay out the instruments and equipment in sequential order. Use the instruments one by one and see that each successive step is completed with the instrument designed for it before that instrument is laid down, and then let it be laid aside, out of the way, as it is not to be used again. When the last instrument is reached and its step accomplished, the operation is done.

To do this well will require a little training, determination and persistence, but the effort is well worth while, since we find, in a comparatively short time, that we are holding ourselves to a higher standard of work as well as gaining speed. I have seen men pull out of a rut and improve their work very greatly while gradually reducing their operating time to less than half of what it had been.

To illustrate this plan, let us apply it to several examples.

In an average Class I cavity in an upper molar, one or two burs, two or, at most, three chisels and a hoe will answer for the preparation up to the final cleansing (four or five steps).

For a Class II cavity in an upper bicuspid, two burs, four chisels, a hoe and a pair of marginal trimmers will suffice up to the final cleansing (eight steps).

Of course, several of these steps could be carried out with the same chisel instead of using four, but the chisel would become dull and have to be resharpened,

and it is better to lay out a fresh chisel for each step and so keep the continuity of the system.

It is not to be understood that each Class II cavity or any other piece of work will require the same instrumentation, but there will be an average with varying deviations which one will visualize and prepare for at the outset.

A Class III cavity may be prepared in six or eight steps with the use of one or two burs, three chisels, a hoe, a 3-2-28 hatchet and perhaps a pair of angle formers. In fact, most Class III cavities can be prepared with one bur, one chisel, a hoe and a hatchet if the chisel is touched up on the stone once or twice during the operation.

Filling and finishing operations may be systematized and carried through with almost as definite steps as cavity preparations.[1]

What I have suggested is merely an outline of principles which should be applied as far as possible to all lines of work. If one will start with instrumentation in cavity preparation and work at it persistently for a month, the results will be such a revelation as will lead one to desire as full an application of these principles as possible to every part of his work.

SUMMARY

Operative dentistry started out well and developed well, considering the many complex problems involved.

If dental prosthesis has forged ahead and taken the lead, it is an evidence that, on the one hand, the public have not availed themselves fully of the possibilities of operative dentistry and, on the other hand, operative dentistry has failed to a degree in its objective.

We are, in effect, facing a challenge. Dentistry is on trial.

The way in which the profession acquits itself within the next decade may be the determining factor in its economic status and in the joy and satisfaction which the individual will have in the conduct of his practice in the future. The hand has begun to write on the wall. It is for us to say whether the writing will conclude with "Thou art found wanting."

With the present agitation about health insurance in its various forms and the large percentage of our population, especially children, not receiving the service which they need and which we ourselves have been trying to make them realize that they do need, coupled with the economic situation of today, the effect of which is likely to continue for some time, it is not difficult to see what the answer may be.

Should state dentistry ever come, we should be prepared to exercise a controlling influence and hold in check forces which might prove detrimental to the interests of both the public and the profession. This preparation demands that we face the present situation frankly and prepare ourselves to do our part in solving this urgent problem. The influence which we will have with the law makers will depend largely on the scientific and practical evidence which we can produce of the value and importance of our services and the spirit in which we render them.

It is not a question of seeing how much of our services we can persuade the public to accept and pay for: there is a public need which we must prepare ourselves to meet in a creditable way and on terms which they can accept.

It has been my desire to offer in this presentation a partial solution to our

1. These were illustrated in moving pictures which followed the lecture.

problems in urging a wider interest in and more effective application of the principles of preventive dentistry, a more scientific knowledge and use of oral diagnosis, with the cultivation of closer relations with the medical profession and a widespread awakening as to the possibilities of more efficient methods of operating.

What the result will be depends largely on whether we apathetically leave the task to our neighbor or we each determinedly put a shoulder to the wheel and go forward.

VINCENT'S INFECTION

By MAURICE SMITH, D.D.S., Los Angeles, Calif.

As defined by Harold Keith Box, research professor of periodontology, Faculty of Dentistry, University of Toronto, Vincent's infection is a necrotic gingivitis, an infectious inflammation of the gingival tissues, exhibiting lesions characteristic as to location and nature and occurring only in mouths in which teeth are present.

It is characterized by a type of pseudomembrane formation, at least by a soft layer composed mainly of bacteria and necrotic tissue, and by superficial ulceration. The disease frequently spreads widely and rapidly, involving other mucous membranes of the mouth, thus establishing a stomatitis as an added complication.

ETIOLOGY

Predisposing factors in the disease are: oral uncleanliness, pernicious anemia, lymphocytosis, diabetes, syphilis, tuberculosis, severe colds, excessive use of tobacco, the presence of decayed teeth and poor dental work, the presence of cryptic tonsils, extreme fatigue, improper diet, malnutrition and hyperemia. An exciting factor is seen in the presence of fusiform bacilli and spirilla.

Sources of contagion are direct contact (kissing), common drinking cups, mouths of bottles, door knobs, telephone receivers, the cough or sneeze and dental instruments.

LOCATION OF INFECTION

Any mucous membrane may be affected as: mouth, lungs, nostrils and middle ear.

SYMPTOMS AND DIAGNOSIS

Bacteriologic finding of fusiform bacilli and spirilla in large numbers affords a positive diagnosis. The deepest seat of infection may be determined by probing. There is a feeling of uneasiness in the mouth and a wedging sensation in the interproximal spaces, a wooden or dead feeling to the bite as if the pericementum were anesthetized. Sometimes, the gums are edematous and show a diffuse bluish discoloration running down between the teeth. The gingiva is inflamed and very painful. Usually the condition develops on the margins of the gingiva. The surface of the oral mucous membrane is raw and bleeds when the grayish membrane is wiped off.

There is a typical odor. The lesion appears as a red patch and there is severe ulceration of lips and gums, tonsils and pharynx, with ulceration of the cheeks

and swelling of the glands provoking lymphocytosis.

Gangrenous mouth lesions are seen in association with leukemia and pernicious anemia, and salivation is noted.

General malaise, pallor of the skin, insomnia, vertigo, lack of appetite, gastric disturbances, vomiting, flatulence, alternating diarrhea and constipation and an exanthematous eruption are sometimes observed.

The patient suffers from lassitude and there is a rise in temperature, with increase in the pulse rate.

A deep ulceration may expose bone. A differential blood count sometimes discloses severe myelogenous leukemia. The type of fusiform organism and the way it stains usually denotes whether the infection is old or new.

BACTERIOLOGY

Fusiform bacilli are gram negative, anaerobic organisms, 10-14 microns in length and less than 1 micron in thickness. They are sometimes straight or a little curved and tapering at the ends. The central portion usually stains less deeply and frequently shows unstained spots or granules.

The culture medium is serum or blood-agar 1:3. The colonies are small and rounded, white to yellow, having a rather felted surface.

The spirochetes are long, irregularly waved, motile organisms, of a corkscrew shape. The spirillum of Vincent's does not show any morphologic change in the chronic or acute types. The fusiform in acute cases is slender and stains a solid color, while, in the chronic lesions, it is

DIFFERENTIAL DIAGNOSIS

Symptoms	Acute Ulcerous Gingivitis-Vincent's	Diphtheria	Syphilis
Constitutional disturbance	Slight	Severe	Mild as a rule
Pain on swallowing	Severe	Usually not much	Sometimes
Glandular involvement	Cervical lymphatics enlarged and tender	Relatively absent	Enlarged and tender (submaxillary glands in second stage)
Membrane removal	Very easy	Difficult	Membrane not detachable
Albuminuria	Rare	Frequently present	Absent
Areal involvement	Gingival border and interproximal septums	Throat, fauces and tonsils	Almost any part of oral cavity; in primary stage, definite sore; in secondary stage, mucous patch.
Temperature rise	Usually from 99 to 99.6 F., sometimes 102-104F.	100–102 F.	Slight (99–100 F.)
Organism found in smear or culture	B. fusiformis and Vincent's spirillum; spirillum sometimes absent.	Klebs-Loeffler	Spirocheta pallida

about three or four times larger and does not stain so heavily, appearing very granular. The fusiform bacilli predominate in milder forms of Vincent's, the spirilla in the more severe cases.

SMEAR AND STAINING TECHNIC

Material to be examined is collected from affected parts with any instrument that will go down deep into the pocket of infection and is spread in a broad thin film over a clean slide which has been flamed and thoroughly cooled. Three or four smears may be made from different parts of the mouth on the one slide by drawing a ring around each smear and labeling the area with a crayola pencil. The film is allowed to dry in the air and is then, with the film side up, passed quickly through the bunsen flame three times, and allowed to cool.

Carbolfuchsin stain is added, completely covering the film, and is then washed off at once. The film should now show red.

Methylene blue stain is added, completely covering the film for thirty seconds or more, this depending on the thickness of the film. The color of the film should be on the blue side of purple. Applications are repeated until this color is obtained.

This is washed off in running water and blotted dry (not rubbed) with clean blotting paper.

A drop of oil of immersion is placed on the film, which is then examined with the oil immersion lens of a microscope.

VARIOUS TREATMENTS

Good results are obtained by many different methods of treatment, and it is suggested that any of the treatments herein listed that afford satisfactory results should be the one to be adopted, being varied only when the infection fails to respond to the particular treatment selected. Extreme care and attention to details in the matter of treatment are most important to the successful conduct of a case of Vincent's infection. Thorough prophylaxis and the removal of all irritation, such as from faulty dental work, and cavities, is absolutely essential immediately after eradication of acute symptoms. The articulation is corrected and the patient instructed in the use of the tooth brush.

Local Treatment.—Medicinal: 1. A 3 or 4 per cent solution of pyridium is applied over the gums and necks of the teeth with a cotton applicator and the patient is requested to refrain from expectorating for a few minutes.

After this treatment, a glycerine pyridium paste is made by adding a few drops of glycerine to mallophene powder and spatulating well. This is then worked in between the teeth.

2. The membrane or slough is washed with a spray of tincture of green soap (1 drachm to 4 ounces of water) or with equal parts hydrogen peroxide and water, and the mouth rinsed with clean water. A powder solution of arsphenamine in glycerine or neo-arsphenamine is applied directly to the lesions, being worked under the free margin of the gums around all the teeth. The patient is then given a 2 per cent aqueous solution of copper sulphate to apply to all parts of the mouth every hour.

3. The area is isolated with cotton rolls; the tissues are dried with cotton or warm air, and the areas are touched lightly with tincture of iodine on a pellet of cotton, followed immediately by a neutralizing 35 per cent aqueous solution of silver nitrate applied with a pellet of cotton, and by irrigation with four glasses of plain warm water. For home use, a teaspoonful of sodium perborate in three-fourths glass of warm water is used immediately on mixing, every hour for the first day or two, then five times a day and

then regularly three times a day for two or three weeks after a negative smear.

A good tooth powder is as follows:

℞ Calcii carbonatis praecipitati	oz. ii
Calcii phosphatis praecipitati	dr. ii
Sodii perboratis	dr. v
Pulvidis radicis iridis	dr. ii
Sacchrini	gr. ss
Oleum gaultheriae	m. xx
Oleum rosae	m. x

M. et fac pulverem. Sig. Use on wet brush three times a day.

Ten days after the first treatment, traumatic occlusion and other local irritating influences are corrected.

A glycerinated zinc iodide solution may be applied:

Zinc iodide	20 parts
Tinc. iodine	20 parts
Distilled water	10 parts
Glycerine	50 parts

The mouth is gently syringed with equal parts of hydrogen peroxide and water. The mouth is kept dry with cotton rolls, the affected parts being then painted with the zinc iodide solution on a cotton applicator. It is also applied between the teeth with a barbed broach wrapped with cotton, once or twice daily. Home treatment consists of use of a sodium perborate mouth wash.

5. In deep chronic cases, a 25 per cent solution of chromic acid, on a very small swab, is applied to the dried gums, and allowed to remain for a minute and then a large swab with 25 per cent solution of argyrol (mild silver protein) is smeared over teeth and gums and the patient is asked to rinse the mouth with it for about two minutes before expectorating.

6. The mouth is thoroughly sprayed and arsphenamine is applied every twenty-four hours for several days. As soon as the condition warrants, all points of irritation, such as calculus and rough margins of prostheses and cavities, are removed and traumatic occlusion corrected. In scaling, the instruments are dipped in arsphenamine solution each time. The frequent brushing of teeth with a few drops of tincture of green soap is ordered along with the use of tooth paste or powder and a rinse of sodium perborate, a teaspoonful to one-half glass of hot water every hour.

7. The slough may be washed away by spraying the mouth with a warm solution of zinc chloride (20 gm. to the liter of water), and then Fowler's solution (solution of potassium arsenite) is applied locally and a sodium perborate mouth wash used every hour for the first three days.

8. Chromic acid crystals are applied to parts with a platinum loop and immediately neutralized with hydrogen peroxide, followed by rinsing with solution of sodium bicarbonate, a teaspoonful to a glass.

9. A 5 per cent solution of phenol in glycerine or methylene blue, applied in the dry form to the lesions with a sodium perborate mouth wash used hourly, is prescribed for home care.

10. Before breakfast, the patient swabs and cleans the gums with cotton dipped in hydrogen peroxide. Every two hours during the day, the mouth is flushed with a warm solution of boric acid to which is added 1 drop of oil of cassia to 2 ounces of the solution. At the office, the mouth is sprayed with hydrogen peroxide followed by the application of tincture of benzoin.

11. Sterilization of the toothbrush by allowing it to soak in a sodium perborate solution or potassium permanganate solution (one crystal to a glass of water) is followed by brushing the teeth and gums gently and then rinsing the mouth with either solution.

12. A 50 per cent solution of silver nitrate is applied to every ulcerated spot and infected pocket once a day for two or three days. A saturated solution of po-

tassium chlorate is prescribed as a mouth wash.

Surgical treatment: Surgical treatment consists of reducing the fusospirochetal organisms to a minimum and then eliminating the pockets surgically as advocated by Dr. Ward or Drs. Crane and Kaplan. The mouth is swabbed with tincture of iodine and block anesthesia is induced. With one of Dr. Ward's interproximal curets, the necrotic tissue in the interproximal spaces is removed down to healthy bone. Then, with an incision on the buccal, labial and lingual surfaces, the interproximal incisions are joined, the pockets being thereby eliminated. The whole area is then syringed off with normal salt solution. Dr. Ward's paste is then mixed thickly and applied to operative areas, completely covering the root and neck of the tooth that has been exposed. This is left in place for from ten to fourteen days, when the paste is removed. The patient is then instructed in oral hygiene.

In deep chronic infection, extraction of teeth is sometimes necessary for arrestment of the infection. Diseased soft tissues may best be removed by an electric cautery, medicinal treatment following.

Systemic Treatment.—An intravenous injection of arsphenamine is made by the physician and sulpharsphenamine is used intramuscularly. The diet should be fluid or semisolid, excluding greasy fried foods, condiments, tobacco and alcoholic drinks. The bowels should be regulated. Orange juice, milk, plenty of water and lettuce should be added to the diet. Four tablets of calomel one-twentieth grain, morning, noon and night, is followed by a saline cathartic. When cases continue over two months, a Wassermann test should be suggested.

SOCIAL RESTRICTIONS

Kissing is banned and the patient must use separate eating and drinking utensils and separate towels. He must be instructed to cover the mouth and nose when coughing or sneezing.

TESTS FOR CURE

Frequent smears from all parts of the mouth should be examined microscopically as the only sure means to ascertain whether the organisms are decreasing in number and whether they have disappeared and remain so (for at least two months after discontinuance of treatment).

PROGNOSIS

A case of Vincent's infection should be treated over a period of at least three weeks to insure the complete eradication of the infection, instead of merely driving it deeper into the tissues by superficial caustics applied over a period of a few days and then dismissing the patient.

The disease is usually easily controlled and a cure effected when the full course of treatment is given.

906 Quinby Building.

ORAL INFECTION AND ITS RELATION TO MAXILLARY SINUSITIS*

By JOHN F. FAIRBAIRN, M.D., Buffalo, N.Y.

INFLAMMATION of the maxillary sinus due to oral infection is transmitted infection as compared with the genuine or direct inflammation which occurs in the course of infectious disease or as a direct result of insult or trauma. The figures on the relative frequency of occurrence of the different types of infection are of little value, as the statistics of clinics vary from 8 per cent, due to oral infection, to as high as 50 per cent from the same cause.

Several factors enter into this wide variance, as climatic, economic and hygienic conditions differ at the various clinical centers. No factor is of greater importance than the hygiene of the mouth, and where, as in most European countries, the poor care given the teeth is almost axiomatic, we should expect and do find a much higher percentage of sinusitis of oral origin than is found in American cities where modern dentistry has succeeded in educating citizens to the value of oral prophylaxis.

The maxillary mucoperiostium is separated from the teeth by a thin layer of compact bone. Davis, in his anatomy of the nasal accessory sinuses, based on the study of 145 heads, states that this bony separation was present in all cases except in a few where it had been destroyed as a result of abscess formation at the root of a tooth. There are anatomically wide variations in the thickness of the antral floor and, because of vascular and lymphatic connections, the bone itself does not afford an absolute, but rather a relative protection to the mucosa of the antrum.

The various pathologic conditions of the teeth and alveolar process which may cause infection of the maxillary sinus need not be discussed here: they are conditions that we deal with daily.

May I enumerate some pathologic conditions which I have seen in my clinical experience? Rupture of an apical abscess of the second molar causing an acute sinusitis was one. On extraction of the tooth, no gross pathologic condition of the alveolus was demonstrable. It was incidentally one of those rare cases in which there was a dehiscence of the antral floor directly over the apex of the root. Granulomas and their secondary apical cyst formations may, owing to resorption of bone, extend to the mucoperiostium of the antrum and, if infected, set up an inflammation. Osteitis, secondary to periostitis, may also spread to the mucoperiostium.

I have never seen inflammation of the maxillary sinus due to the presence of a dentigerous cyst, although cases have been reported. I believe that cases of sinusitis following accidental opening of the antrum by the extrac-

*Read before the Section on Oral Surgery, Exodontia and Anesthesia at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 15, 1932.

tion of a tooth, no disease of the root or alveolus being present, are due partially to the habit of syringing out the antrum to see whether secretion or infection is present. The insult to the mucosa by the syringing may, of itself, set up a low grade inflammation; nor can we disregard the possibility of introducing foreign or infectious material.

I have seen one case of maxillary sinus inflammation due to pyorrhea. It was unusual in my experience, because I was able to follow the entire course of the case.

J. B., a man, aged 40, was under my care for a chronic catarrhal otitis media. In the course of the treatment, I had to see him twice a week. He came in one day and complained of a very profuse serosanguinolent discharge of two days' duration, which had already caused marked excoriation of the upper lip and also of the nose. A smear showed streptococci. On putting his head in a position to favor antral drainage, there was an increased flow from the nose, a dripping in fact. He had no pain, as is often the case in acute infections, but a general feeling of malaise and intoxication. Routine examination showed the clinical picture of pyorrhea involving several teeth. The patient was referred to his dentist, who cleaned all the teeth, treated the pyorrhea, and reported a deep lateral pus pocket of the first molar. When this abscess was eliminated, there was marked amelioration of the nasal condition, with cessation, in two weeks, of all nasal symptoms. The antral condition was treated constitutionally by improving the elimination and rest, locally by maintaining aeration and drainage through the ostia. There was absolutely no surgical interference.

This case represents to me an infection by way of vascular or lymph channels.

The diagnosis of maxillary sinusitis having been made from the history of the case, and by rhinoscopic inspection, confirmed if necessary by antral washing either through the natural ostia or by antral puncture, it is then necessary to determine the underlying cause. There are certain symptoms which lead one to suspect an oral origin. Cacosmia is a symptom as a rule in cases of oral origin. In fact, the subjective foul odor rather than any other symptom brings the patient to the rhinologist.

Pain, while at best an uncertain localizing symptom of sinusitis, may, by its type, lead one to suspect a dental origin. For instance, a history of pain in the upper jaw for several days with relief following discharge of pus from the nose suggests rupture of an abscess into the antrum. I place little reliance on pain alone for diagnosis, as an acute inflammation of the sphenoid can give a similar picture.

All cases of maxillary sinusitis, even those with a history of direct infection, which do not show rapid improvement under ordinary treatment are referred for a dental report. Roentgenograms of the antrum and teeth are ordered, and on these, if disease is present, treatment is based.

If we keep in mind the underlying pathologic condition in the type of infection under discussion, it is evident that, for a cure, the services of the oral surgeon are even more necessary than those of the rhinologist. Knowing the tendency of antral infections to recovery, and mindful of the relative infrequency of absolutely indicated radical interference, I have become very conservative in my treatment.

The first step, of course, is in your hands, the removal or treatment of all oral disease; i. e., the removal of carious teeth, granuloma, cysts, rarefied bone, etc. If, in the removal of pathologic tissue, the antrum is opened through the alveolar process, I urge that its closure be effected as promptly as possible; for while treatment through the alveolar process was once a recognized procedure,

my feeling about the old Cowper operation and treatment can best be expressed by quoting Voorhees[1] who describes it as "the worst operation in surgery, converting a simple condition into a chronic suppuration." The oral condition having been cared for, in the majority of cases, unless we are dealing with chronic infection of long standing, the antrum will respond to treatment by aeration and maintenance of natural drainage; or, if necessary, on account of persistence of symptoms, to washing. Only rarely, and owing to abnormal blocking of the ostia, have I found it necessary to make an additional drainage opening through the antral wall under the inferior turbinate; the so-called Mickulicz operation.

Of course, in those cases which show no response to these simple measures, radical operation may be necessary. In such cases, the operation of preference is the Denker, as it gives an excellent opportunity to eliminate all pathologic conditions, and the final step in the procedure, the placing of the flap of nasal mucosa on the denuded floor of the antrum, hastens the ultimate recovering of the walls with normal mucosa, as well as insuring the persistence of the artificial opening.

1. Voorhees, I. W.: Laryngoscope, 37:431-432 (June) 1927.

SAVAGE BEAUTY*

By HAROLD STEIN, San Francisco, Calif.

IT is in the Australian bush. Night's star-studded canopy melts all objects into a soft whole without detail. Somewhere a drum beats. Deep in the forest, another answers. Seated in the darkness in a great circle are many people come to witness the last phase of the initiatory rites of the tribe. They are silent; silent with an almost audible sense of expectancy. From out of the darkness steps a wrinkled old man. The circle opens to let him through. He squats by a pile of brush arranged to make a fire. Out of an old bag fashioned of animal skin, he takes a slab of wood and a long spindle-shaped stick. The stick twirls between the palms of his two supple hands — faster — faster — faster. Smoke comes. Fire comes. The miracle of recreating the life-giving sun heat has come to pass. The pile of faggots is ignited. Flames leap up. Faces appear out of the darkness. They assume individuality but no expression. Only expectation. Flattened hands beat upon taut drumheads. Again the answer from the forest. This time closer. Ever closer. . . .

A procession comes. Guided by the older men in charge of the rites come twelve adolescent boys. They are nude, yet covered with gray ashes which cling to their hair, which, attached to their eyebrows and lashes, create a queer spectacle-like effect. They march around the fire, the utter silence broken only by the drum-beats now amplified by He Who Drummed in the Darkness.

*A brief study of nonprophylactic mutilation of teeth among primitive peoples.

They lay down, radiating from the fire. The witch doctor kneels over the first lad from behind. He draws back his upper lip and places a blunt wedge of hardwood against a tooth. Beats on the wedge with a mallet. Slow, methodical blows. The tooth loosens. Is lifted out for all to see. Is then tossed far off into the outer darkness. The witch doctor goes on to the next initiate. His first patient shudders slightly. Great beads of perspiration mingled with dirt and ashes trickle down his face to mix with the blood-stained froth at the juncture of his lips; but what matters it all? *He is a Man*—has passed his last test. And while his heart pounds with the joy of it all, he hears the methodical, maddening slow beating of the medicine man's mallet on the tooth of the next lad. . . .

The nonprophylactic mutilation or decoration of teeth is a part of the initiatory rites of many primitive peoples, widely distributed over the surface of the earth. Africa, Polynesia, Australia, New Guinea and the Philippine Islands have contributed to our knowledge of this to us needless and harmful practice. The purpose of this brief discussion will be to set forward a few facts and conclusions which may throw a little light on a most interesting subject.

Mutilation, while not always of religious significance, has been found to follow along certain quite definite lines. Schroeder established seven principal forms of mutilation:

Simple pointing of the teeth.

Filing of the teeth, forming gaps and prongs.

Removing the teeth.

Horizontal filing of the teeth or removal of the crown.

Dyeing of the teeth.

Adorning the teeth with metal or stone inlays.

Changing the position of the teeth.

Among peoples practicing mutilation as a part of the puberty rites, the first three practices are common. Their origin is obscure, but it may well be assumed that the simple pointing and the more radical filing had their foundation in the testing of courage, the initiate suffering great pain without any outward indications of his suffering and, in the creating of a fierce appearance, following the reasoning line that, as the beasts of the jungle have sharp fangs, by that same token he who has sharp fangs will be endowed with the animal's qualities of courage, cunning and endurance.

Complete removal tested courage and had its roots in the widespread belief of substitution. The extracted tooth was either worn by the initiate as an amulet, proof of proven and demonstrated stoicism, or was flung into the woods in the hope that a wild beast would devour it, thereby endowing the former owner of the tooth with its own qualities.

We are not so very civilized ourselves. I well remember an incident from my own childhood: A tooth fell out and my old-country nurse threw it into a dark recess of an attic saying: "Nah, then, the rats will eat 'im up and you, manny, shall have fine, strong, white teeth like yon rats."

Causes contributing to tooth mutilation entirely apart from those connected with ceremonial rites are those which are founded in the desire for self decoration and adornment. It is difficult for us to appreciate the beauty of horribly misshapen teeth, discolored and stumpy. We have, after years of habituation and education, come to regard straight, white, well-kept teeth as a mark of health and beauty, and so it is difficult for us to understand a diametrically opposed point of view. That which to us appears nor-

mal and beautiful is to many primitives abnormal and ugly, and vice versa. To the savage, there is beauty in a series of pointed, jagged teeth, pronged or painted a brilliant ebony. The man with sound teeth is regarded more or less as an outcast.

I quote from a recent article in the *National Geographic Magazine:*

> Practically all of the Bataks file their teeth upon reaching maturity. With a great many the teeth are chipped off to the level of the gums. Presumably the practise enhances beauty to Batak eyes. The unsightliness of the mouth to western eyes is further emphasized by the chewing of quantities of blood red betel nut.
>
> In the open market place the native dentist does his work, with the patient lying at full length on his back on the ground. A mallet and chisel, a file and a small saw are his implements; with these he chips and files the teeth down . . . the teeth are sharpened for a few cents each.

The dyeing and discoloration of teeth has direct sexual significance and is a widespread custom, frequently surrounded by strict taboos. Margareth Matches, writing of New Guinea, describes the process of blackening the teeth as follows:

> The constituents used are tawal, a soil containing sulphur, and talis, a pungent leaf. These are baked separately, wrapped in leaves and mixed together, the mixture resembling coal tar. Cooling hardens it a little and it is then spread on a leaf of a size to cover the teeth. It is placed over the outside of the upper and lower rows of teeth. The native undergoing this beautification can eat nothing for three days, nor can he talk. The tawal sets like enamel and glistens like polished enamel or ebony.
>
> During the days of tawal setting the initiate is kept in confinement, and no woman may look upon him. . . .

Among the Kalingas of the Philippines, blackening of the teeth is done in groups of both sexes who mutually assist each other. The kin of the opposite sex may not be present at or witness this ceremony, which is protected by strong taboos.

Further decoration is sometimes accomplished by the women of the Benguet tribe, who adorn themselves with a gold shield placed in front of their teeth on festive occasions.

CONCLUSION

Mutilation of teeth among primitive peoples is a custom leading back to the beginning of mankind. It is undertaken as a part of the initiatory rites denoting the passage of the boy from adolescence into manhood, in order to test his courage, endow him with supernatural qualities and visibly mark him as being a man.

Decorating of teeth, as painting with black materials, has secondary sexual significance and is considered a mark of beauty. It is a widespread custom and is often surrounded by strong taboos.

The two practices, mutilation and decoration, overlap in their meaning, but their function is primarily as described. The consequence of these radical measures should be evident to any student of dental pathology. The primitive man is rendered beautiful or demonstrates his bravery at a great price, payable through a lifetime of illness and suffering, but being unable to associate effect with cause, he carries on the vicious chain of custom through generation after generation, unconsciously, yet certainly, weakening the strain of his race.

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Editorials

OUR DIAMOND JUBILEE

August 7 to 12, 1933, will be held the Diamond Jubilee of the American Dental Association in conjunction with the meeting of the Chicago Centennial Dental Congress. Plans are well under way to make this the greatest dental meeting ever held in the history of the world. Seldom has there been such elaborate preparation for any meeting, and the committees are working, each in its proper sphere, to make the event in every way an outstanding success.

In this issue of THE JOURNAL will be found the preliminary program, and by the time it is delivered to our members every paper and radio talk will be in the hands of the various committees for proper supervision and any possible consideration that may be desirable. This careful scrutiny has been deemed necessary to prevent any ill considered or immature presentation that may through any agency creep into the program. In the best laid plans of the

past, papers have slipped in at the last moment that were only too evidently thrown together without due preparation or deliberation on the part of the authors, with the result that the proceedings have been marred by the inclusion of much irrelevant, amateurish and poorly digested material. The demand for the early submission of papers had its incentive in this fact, and the committees have done well to place this safeguard around the acceptance of papers. Under this arrangement, the members in attendance may be assured of the opportunity to listen to well digested and well considered papers that are not only selected with discriminating care but also as well prepared as is humanly possible.

An event that celebrates the Diamond Jubilee of any organization is something to be reckoned with. The American Dental Association has had a record of outstanding achievements, and the profession in this country has been integrated and brought into a cohesive whole through this agency to a higher degree than would have been possible by any other means. It has come, without cavil, to be known as the greatest dental organization in the world, and, in the long years of its service to humanity, it has evolved one activity after another, till today it is serving the profession and the citizens at large in a most comprehensive manner. In its various departments, it is reaching out to aid in every worthy endeavor toward the elevation of the profession, and the furtherance of human welfare.

For this coming Diamond Jubilee, the officers have been working hard in conjunction with the officers and committees of the Chicago Centennial Dental Congress to provide professional and social entertainment for the great influx of visitors that will be certain to come to Chicago in August, and our members may be assured of a treat that has seldom or never been provided for any dental gathering before.

The World's Fair itself is proving a notable success in every way, and there will be a double incentive for dentists to come to Chicago in August, the opportunity to visit the Fair and see the wonders that are provided for the entertainment and instruction of the world, and the privilege of participating in one of the greatest dental meetings ever held, at a very nominal expense and under the most

favorable auspices. Another incentive for attending this meeting that will appeal to the rank and file of the profession is the extent and character of the dental exhibits that are being prepared for this occasion. The latest and best in the science and art of dentistry will receive ample demonstration, and this feature of our meetings frequently makes a greater appeal than almost any other. Everything has been provided for the comfort and convenience of those in attendance, and the member who does not attend will not only be missing the opportunity of a lifetime, but will also be sure to regret it ever after. Make your plans now—the time is none too long.

LIFE INSURANCE AND THE A.D.A.

In all of the enterprises of men, in connection with our present civilization, life insurance in certain of its phases presents the most praiseworthy, stable and satisfactory service to mankind that has yet been evolved. It is the sheet anchor of protection against all of the varied exigencies of life, and no man should consider himself safe without taking advantage of its privileges.

About three and one-half years ago, a group insurance plan was inaugurated in connection with the American Dental Association whereby a lower premium was made available to our members than at the regular rates. At the time that the rates were announced, there was no agreement that they would be made permanent; in other words, that they would never be changed. Manifestly, the regulation of the rates must be governed by the conditions in operation as the plan developed, or as the age average of the members applying for insurance could be determined. In the past year or so, there have been very few of the younger members applying for insurance, owing in part to the general financial stress, and thus it has been impossible to offset the increasing age average. It can readily be seen that if no new members were added, the average age for the group would be one year higher each year.

We are indebted to Fred A. Richmond, insurance secretary of the A.D.A., for much of the information herein contained. According to Dr. Richmond, this question was carefully considered by the

Board of Trustees at the Memphis meeting, and it was suggested that the cost be rearranged on a basis that would make the insurance more attractive to the younger members, the contention on their part being that a flat rate regardless of age really resulted in a means of collecting from the younger member to pay part of carrying the older member.

Accordingly, May 1, 1933, a new table of rates was announced based on four years' actual experience as fair and reasonable to all concerned, by which each age class will now be carrying its own burden. The accompanying table gives the new rates.

Ages	Annual Cost $3,000 Insurance	Semi-Annual Cost $3,000 Insurance
21 to 30, inclusive	$18.50	$ 9.50
31 to 40, inclusive	24.50	12.50
41 to 50, inclusive	32.00	16.25
51 and over	49.40	24.95

When these new rates were announced, a few of our members seemed to feel that the present rate schedule was a breach of contract, but this is by no means the case. As has just been said, no assurance was ever given that the first rate announced was to be permanent. The contract quotes a definite schedule of rates, but, up to date, our premiums to the company have been 30 to 35 per cent under the schedule permitted the company by the contract; which assuredly does not look like a breach of contract. We are merely trying to adjust the rates to make them equitable and fair to all, and we are sure that when they are perfectly understood, there will be no objection on the part of anyone, old or young, particularly when the premiums are lower than could be obtained by any other plan than the group policy.

It is the most natural thing in the world for men to demur when they are called on to pay more for a given service than they had supposed they were to pay, but if the men had made themselves familiar with the contract, they would have seen that even with the slightly increased rates for certain classes in vogue at present, the rates are well within the contract, and, as a matter of fact, every member aged 51 or over had had protection for three and one-half years at less than his share of the actual cost, based on both mortality experience and the contract.

The service rendered our members through the medium of group insurance has been a matter for congratulation to all concerned. More than 290 claims have been paid to beneficiaries and disabled members, totalling $738,000, a record that is really outstanding when commercial and industrial conditions the world over are considered.

We are very sure that when due deliberation is given this matter on the part of our insured members, they will loyally and cordially cooperate with the insurance company and the Association, particularly when they understand the equity and justice of the present regulations, and when they realize that only through some such logical arrangement can the enterprise function with security and to the ultimate satisfaction of all.

WHERE SHALL I PRACTICE?

"Where shall I practice?" is a weighty question to a senior dental student. Of his favorite teacher, his dean of men, he asks it often. It constitutes the nucleus of his conversation in the halls and deflects his attention from last-year studies. Seeking an answer, he scans the "offices for sale" columns in the bulletins, wears his shoes out and his purse, journeying to far localities and suburbs to count nameplates and signs, to contemplate corners.

Offspring to this pursuit are worries over the pros and cons of office equipment. Should I buy out an old practitioner? Is it better to go deeply into debt for the latest equipment or could I get along with furnishings in oak and a Betz unit? He has heard the sirens sing of "the best" as a practice builder, of debt as an incentive, telling him that he must compete with the established practitioner and must allow for no handicaps. What of going in with some one already well along toward a fortune for a year or two? And so on.

In a busy world where "dog eats dog," no one has time to share his woes for long. Counsel is a thankless commodity anyway. A short reply from a dean whose dignity is too precious to allow comradeship or too thin to hide his small precipitate of experience does not satisfy. The youth's gravity, his worry, is a small matter

to most, because, forsooth, didn't all have to begin, all have their hard knocks? Hard knocks will be good for this youngster too! Advice from men in any neighborhood he fancies is always discouraging, for a reason easily divined. As a last resort, he falls back upon the supply man, who may be sincere enough, but whose sagacity is always alloyed with a desire to sell.

Many young men feel themselves the least common denominator at that moment when the president hands them their diplomas, and looses them to a devouring world. With an impressive gesture, the commencement speaker had said, "The world awaits you," a favorite phrase for the indigent of mind. It waits, but how? Unconsciously, as far as its new adventurers are concerned, and indifferently. It waits, rushing hysterically by every man intent upon his own sale or purchase, every woman upon some bargain or what to get for the next meal. Our graduate is a bit of flotsam on the edge of the flood, a bit of jetsam with the jitters. If he gets aught from such a waiting world, he will have to "go and get it." But where to go, how to announce his advent after he gets there, are dismaying problems.

These last days have seen such young men by scores immured in a cryptlike office in a mausoleum of modern architecture, staring idly at the stark outline of a unit or contemplating the wave in their hair in the mahogany smoothness of an American cabinet, also unpaid for, and wondering why and how the world waits. Still this thesis is not confirmed only by late days. Days long past vouch for the truth of it. That location, that equipment, the lone, long wait: they are generations old. And those same generations prove that these items are the inconsiderables, are not of major importance.

Assuming that an office is not established in some "no man's land," these problems all dwindle; the number of nameplates, the glory of the aristocrat's suite is not the ponderating element. The element that does count comes to mind with a sort of military certainty. Like the infant egotist, it announces itself, "Me's here!" And the presence of the predominating issue is conceded: the man himself.

Tell that to a group of students and their lips will curl. They came into the college nondescripts out of the social chaos; they go out burnished for specialization. They were mere hands; now they are professional men. Three years or four have seen a metamorphosis. Now, they want a charted blue-printed plan for success, and it cannot be had. The difference in conditions is that one is an experiment *in vitro,* the other *in vivo;* one is a factory procedure; the other is life! Tell that to a company of practitioners struggling in the fringe of sufficiency and the word would be drowned in derision. Every man desires to save his face, to stamp his history with honesty, his efforts and judgment with wisdom. The fact holds. The most valuable asset a man takes to market is himself.

No ethical code restrains or restricts this investment. A man's identity, his individuality, his ego is his sine qua non of acceptability. Other things are mere addenda that range in seried gradations after a first long step down from that prime requisite. Take it or leave it. And, strangely, this is the last item mentioned in all economic scales. Or it may never be discussed. Students are taught nothing about its successful investment, the possibility of its returns. Yet, unconsciously, every man trades on it every day, buys and sells, wins or loses.

Mayhap misunderstanding, lack of clear statement of a professional man's prerogatives is responsible. A professional man must not advertise, dare not advertise or he is demoted from the plane of high deserts. Yet the announcement of his name, his appearance on the street proclaims him. He is allowed one blast of the trumpet when he opens his office, signs his lease for the first time. From that moment, he sits and waits for his waiting world. He waits while his nerves fray, while his courage wanes, while his hopes fade and his plans vanish, leaving a nausea of spirit that prenotes tragedy.

By what mental jugglery does a man claim the cognizance of a community, a man who has come from nowhere, by painting a sign on a window or sending cards to persons chosen from a directory? He is at one with the peddlar of addled music under his own window. He has given nothing to those about him except the

tawdry adornment on his window pane and yet he expects support! Accidents do happen to start him off betimes: relief to a pain-stricken comer after closing time; a correct diagnosis sought in despair by some one tortured but unrelieved by previous blunders, and he sails on a sea of success. Eldorados found in that fashion are dispiritingly few.

It is said that he brings his professional skill to the community to give it in return for patronage. In other words, his labor for their dollar, as does the white-wings on the street. A dollar's worth of labor for a dollar! Shade of Hippocrates! The community has not been conscious of a new need! It has sent out no SOS for a new practitioner. The man has intruded himself and yet complains as though he had been invited. Doubtless there is room for him. That he may prove, but he has no reason to denounce his possible supporters who ignore his presence. A man owes something to the community to which he attaches himself besides an exchange on the market. And the amount he owes is commensurate with his intelligence. Hence, the professional man owes something the street-sweeper cannot give. What he owes becomes his measure of citizenship; what he pays, his worth as a citizen. Every dentist in an American commonwealth is a citizen first and a professional man next. Practice, good or bad, may well be the interest on the investment a man makes of himself. It is the just increment of his personality, a merited return for the ego spent in the common good.

N. G. T.

THE VALUE OF DENTAL RESEARCH TO THE COMMUNITY

When a concrete example is given to the community of the value of dental research as it affects the citizens, there can be little doubt of the great benefit to the profession in the way of recognition and even of prestige.

Such an example is noted in a paper by Frederick S. McKay in the present issue of THE JOURNAL in which is recited an instance wherein a community was suffering from the disfigurement of mottled enamel among the children which was due to the drinking

water. On account of his well known interest in this subject, Dr. McKay was invited, in February, 1925, to visit the community, where in a public address, he pointed out to the citizens the probable cause of the affliction and strongly urged that a different supply of drinking water be furnished and the result noted. On his recommendation, a bond issue was floated to finance a new supply. In a subsequent visit, in February, 1933, on a reexamination, he found that, after the change in water, there had been no new cases of mottled enamel, and this fact naturally made a profound impression on the citizens of the community.

A rather spectacular demonstration of this character probably did more to reveal the importance of dentistry to the community than would have been possible through years of dental service of the ordinary type, and it was a fortunate circumstance that Dr. McKay had the vision early in his experience with this affection, and was able to save the children of the community from future deformity of this character, a deformity sufficiently conspicuous and disfiguring to make it almost a public calamity.

The latest advices seem to point unerringly to fluorine in the water as the agency responsible for mottling of the enamel, and thus we are confronted with one more menace to the welfare and happiness of the people, only to have this menace removed through the agency of scientific research. All honor to the research workers throughout the world who are laboring without stint, and ofttimes almost without pay, to throw light in the dark places of disease and disfigurement to the end that humanity may be relieved of the burdens and handicaps of life, and that little children may have a better heritage and a fuller life in which to grow and develop their physical and mental qualities. The value to dentistry of Dr. McKay's demonstration must be apparent to everyone, the profession as well as the citizens.

AN IMPORTANT CONFERENCE

April 28, 1933, a conference was held between the Executive Council of the American Dental Association Committee for Dental Health Survey and a special committee of the Association of State

and Provincial Health Officers, with the U. S. Public Health Service. As announced in the April issue, the movement for a systematic survey of dental health matters under the auspices of the U. S. Public Health Service in conjunction with a committee of the American Dental Association is well under way.

At the conference April 28, the Association of State and Provincial Health officers was brought into the picture in an advisory capacity, and much constructive deliberation was manifest. The conference was called to order by Surgeon-General Hugh S. Cumming of the U. S. Public Health Service with the following present:

Executive Council, Committee for Dental Health Survey
of the
American Dental Association

Dr. G. Walter Dittmar, President, A.D.A., member ex officio
Dr. C. T. Messner, Chairman
Dr. Homer C. Brown, member
Dr. C. Willard Camalier, member
Dr. W. H. G. Logan, member
Dr. Albert L. Midgley, member
Dr. J. Ben Robinson, member
Dr. F. C. Cady, member
Dr. H. T. Dean, Secretary

Committee of the State and Provincial Health Authorities

Dr. Theodore P. Appel, secretary, Pennsylvania Department of Health
Dr. W. F. Draper, state health commissioner of Virginia
Dr. Arthur C. Jost, executive health officer, Delaware Department of Health
Dr. Robert H. Riley, secretary, Maryland Board of Health

U. S. Public Health Service

Assistant Surgeon-General L. R. Thompson, U.S.P.H.S.
Assistant Surgeon-General C. E. Waller, U.S.P.H.S.
Surgeon J. W. Mountin, U.S.P.H.S.

The Surgeon General made a very constructive and encouraging address, outlining the need of a closer association between physicians and dentists, and particularly between dentists and the various public health agencies.

The chairman of the survey committee, Dr. C. T. Messner, gave a history of the movement and advocated cooperation among all interested bodies, particularly the state health officers.

The President of the American Dental Association, Dr. G. Walter Dittmar, stressed the need of cooperation, and deplored the lack

of dental activities in the state, county and municipal organizations. He also stressed the need of the fact finding survey as a prime requisite to further development.

Other speakers were Assistant Surgeon-General C. E. Waller, Dr. Theodore P. Appel, secretary of the department of health, Harrisburg, Pa., Dr. Arthur C. Jost, executive health officer of the state department of health, Dover, Del., and Dr. Robert H. Riley, secretary of the board of health, Baltimore, Md.

Drs. Logan, Midgley, Brown, Robinson and Camalier of the American Dental Association and Dr. Mountin of the U. S. Public Health Service also spoke. Dr. Draper, state health commissioner of Virginia, described in detail what is known as the five-star program now in use in Virginia.

The following resolution was adopted:

That the committee of state and provincial health authorities approve the dental health survey as proposed to the Public Health Service and that it cooperate with the American Dental Association and the U. S. Public Health Service to the fullest extent in carrying out the study.

Before the conference adjourned, the Public Health Service was requested to "survey existing dental health service facilities and activities in state, municipal and county public health organizations and educational institutions and organizations."

It was decided that the Committee on Dental Health Survey meet on Tuesday at 8:30 a. m., Aug. 8, 1933, during the Annual Session of the American Dental Association in Chicago.

The possibilities of this movement are well-nigh unlimited. There is no question of the great value of a tie-up between groups of this character where the interests interlock so intimately, and where so much concrete good may be accomplished. It brings in closer touch not only the medical and dental practitioners generally, but in particular that part of the medical profession best able to bring home to the people the value of cooperation for the general good. The state and provincial health officers stand in a very intimate relationship to the people at large, and they can exert a most salutary influence on the health and well-being of the community through the agency of improved oral conditions. This contact seems to us very desirable and we trust that the effort may be consummated in the most expeditious manner.

Obituaries

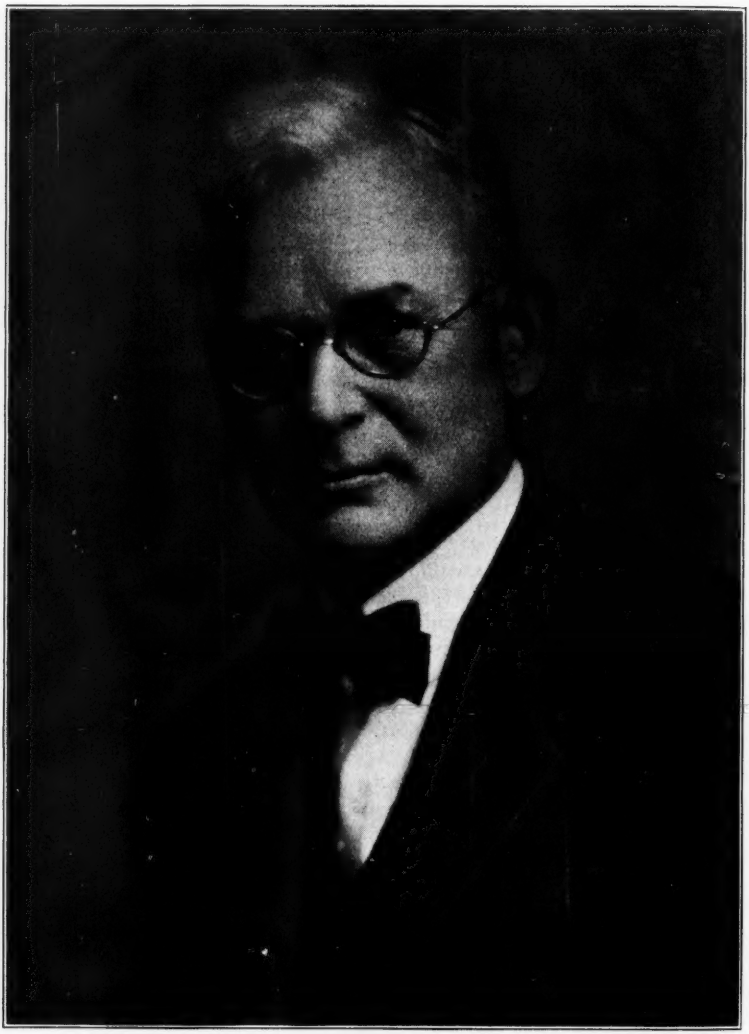
GEORGE S. MONSON, D.D.S.
(1869-1933)

George S. Monson was born, March 20, 1869, in St. Paul, Minn. He had a very meager preliminary education owing to the fact that his father died before his grammar school education was completed and he was compelled to go to work along with other members of his family. After a season working as a member of a crew painting water tanks for the Great Northern Railroad, he returned to St. Paul and went into a dental office, where he acted as errand boy, assistant, and janitor. He continued in this work until 1891, when he entered the Dental College of the University of Minnesota, working his way through school. During part of the time, he acted as a demonstrator in prosthesis and orthodontia under the direction of the late C. M. Bailey, of Minneapolis, one of the pioneers of dentistry in this state. He was graduated from the Dental College of the University of Minnesota in 1893. After graduation, he started practice in St. Paul, where he had practiced ever since.

Dr. Monson was made instructor in prosthesis and orthodontia in 1893 at the University of Minnesota and continued as such until 1897. During his school work, he made several castings. While they were crude, it was essentially the same process that is being used now in casting inlays. Also, during his school work and his teaching career, he recognized that there was a great need for an instrument for diagnostic purposes in orthodontia. He worked on this idea for several years and, in 1898, he laid down his premise for the spherical theory of occlusion, about which he has written a great deal. He devoted practically his entire professional career to research to establish a scientific basis for this theory. At the New Orleans meeting of the National Dental Association in 1919, he presented a paper which is the basis for the spherical theory of occlusion as it is now taught and accepted by the profession. Thereafter, he wrote a great many papers and did a great deal of work along that line.

A number of his friends conceived the idea of establishing a study club for the purpose of carrying on his work. This is known as the Monson Research and Clinic Club and is being carried on at the present time. Several clubs of a similar nature have been formed throughout the country. He felt very proud of "his boys" who were carrying on this work for him.

Dr. Monson was a life member of the St. Paul District Dental Society and the Minnesota State Dental Association, an active member of the American Dental Association, an honorary member of the Minneapolis District Dental Society and Southern Minnesota District Dental Society, and an honorary life member of the American Full Denture Society. He was a Fellow of the American College of Dentists



GEORGE S. MONSON, D.D.S.
(1869-1933)

and honorary president of the International Dental Congress in Philadelphia in 1926. He was a member of Summit Lodge No. 163 A. F. and A. M.

Dr. Monson was married in 1894 to Bertha Gordon, of St. Paul. He is survived by his widow and daughter Ruth, two sisters and a brother.

He was ill about three weeks previous to his death, which occurred May 27, at the Miller Hospital in St. Paul. Burial took place May 29, in St. Paul.

L. M. CRUTTENDEN.

WILLIAM FRANKLIN STONE, D.D.S.

(1889-1933)

The sudden passing of William F. Stone, May 9, caused great sorrow among his many friends throughout the State of Tennessee and the South and was a distinct loss to the profession of the state.

Dr. Stone was born in Bledsoe County, Tennessee, Dec. 11, 1884. He was educated in the public schools of Athens and was a graduate of Vanderbilt University in the class of 1907. After graduation, he entered the practice of dentistry in Cleveland, Tenn., continuing for a period of five years. In 1912, he located in Chattanooga, where he practiced until the time of his death.

He was a member of the Third District Dental Society, State Dental Society of Tennessee and the American Dental Association. He held numerous offices in the local society and was president of the Tennessee State Dental Society in 1929.

Dr. Stone was a prominent member of many organizations in Chattanooga and was a member of the Chattanooga Golf and Country Club and the Fairyland Golf and Country Club. Golf was one of his great hobbies, along with mechanics, and it was this love of mechanics that gave him the reputation as an exceptionally capable operator.

Surviving are the widow, who was formerly Edith Nancy Brown; a daughter, Edith, and one son, William F., Jr.

CLAUDE R. WOOD.

BUREAU OF PUBLIC RELATIONS

PREVENTIVE DENTISTRY AS THE RESPONSIBILITY OF THE DENTIST IN THE FIELD OF PUBLIC HEALTH*

By GEORGE H. WANDEL,† D.D.S.

THERE have been many definitions offered for the expression "preventive dentistry," most of which have been more or less misleading. Some of us have no doubt developed the idea that preventive dentistry is built around nutrition alone, or prophylaxis, or prophylactic odontotomy, or a combination of several factors some of which have not been mentioned here. Let us analyze this problem of preventive dentistry and try to determine whether it is an expression of limitation or one of broad and generous application. According to the dictionary, the word "prevent" means to stop or make impossible of occurrence. The word "preventive" means that which stops or makes impossible of occurrence. "Dentistry" is defined as the professional care of the teeth. We have in our professional consideration of the teeth established certain dental normalities. We have the normal occlusion, the normal pulp, normal gum and bone tissues, etc. Deviations from those dental normalities constitute our idea of abnormality and disease. Prevention, as applied to dentistry, implies the possible appearance or existence of abnormality and disease. Therefore, if we were to define preventive dentistry on the basis of this previous analysis, we would say that it is that type of professional care of the teeth which stops or makes impossible the occurrence of any deviation from dental normality. That definition is fine as far as it goes, but does it not seem to carry with it an expression of limitation? Does it not fail to establish specifically the modern version of prevention as it is applied in the field of public health?

From the standpoint of prevention, types of general dental practitioners can be classified as follows:

1. The type who practice prevention only on the patients that come within the confines of the office. This group may be further divided into (1) those who practice only on adults and (2) those who will work conscientiously for both child and adult patients. The original group may be divided also into (1) those who practice prevention in a strictly technical manner, extending cavity preparation for prevention or carefully following the anatomic requirements of restoration as regards contour, contact points, occlusion, etc., but give not a word of information to their patients on the many questions closely related to prevention; and (2) those who practice all of the technical phases of prevention

*Read before the Dental Health Educational Committee meeting of the Missouri State Dental Association, St. Louis, May 15, 1933.

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but are generous in the amount of constructive information that they give to their patients.

2. The type of practitioner who not only deals with the individuals within the confines of his office but also interests himself in those who have probably never been inside any office. Within his office, he practices and preaches prevention in all its branches. Outside his office, he is largely a preacher of prevention. He tries to educate in various ways those persons whose ignorance of prevention and of dental care has made or is making of them prospective dental cripples.

3. The type of dentist who can in no meaning of the word be called a preventive practitioner. He does not practice technical prevention in his office. He seldom takes care of child patients. He does nothing to educate either his patients or the public at large.

With the various classifications here outlined let us revert to the question of "limitation": As has been said, the definition of preventive dentistry is fine as far as it goes, but it may seem to carry with it an expression of limitation when applied to the modern idea of public health. When we use the words "public health," are we thinking only of those persons who come to our offices or are we considering our entire population? When we consult the dictionary, we find that the word "public" is defined as follows: "of or pertaining to the people; pertaining to or affecting a nation, state or community; opposed to private; open to the knowledge of all." On that basis, can any practitioner who limits his practice of preventive dentistry to his immediate patients, be they child or adult, lay claim to such practice in the interests of the public? Can it be said that he practices prevention in its broadest meaning? We cannot concur in such a claim.

We have long been familiar with the widespread existence of dental disease. Many of us have interested ourselves in the problems of prevention as they have affected the public health. In some sections of the country, this interest has been very apparent, but, in many areas, there is still little evidence of an awakening in this respect. This lack of activity can be laid largely upon the shoulders of the dental profession in those sections. No one else can be held to blame. Does not the dental profession possess the knowledge and information pertaining to the care of the teeth? How else than through the efforts of the profession will that information be transmitted to the public? Can it be said that we owe nothing to the public when we are dependent on it for our livelihood? Can it be said that just because we are professional men, we may close our minds to that "inner" voice speaking in the question, "Am I my brother's keeper?" If such is the case, we have failed to grasp the real meaning of professional service and are neglecting the most important requirements upon which rest our professional independence and future security.

Missouri is demonstrating that she is awake. The progress she has made in the interests of dental health from a public standpoint is remarkable. The work that has been undertaken in this state whereby approximately 450 of her dentists are contributing their time to the examination of 620,000 school children is ample evidence that the dental profession in this state is interpreting preventive dentistry in its true relation to the public health. These men have not been content to do only this work, but have devoted time and money to the ed-

ucation of the public through lectures, exhibits and other forms of contact. Still not content, many have contributed free dental service to indigent children who have come to their offices. Such professional service and public interest is a credit to the Missouri State Dental Society, its public education committee, the Missouri State Board of Health and its able dental representative, A. W. Herington. If the dental profession throughout the United States could absorb the spirit of public service here exhibited, preventive dentistry would then become a universal actuality.

Now and then, the value and need of examination programs have been questioned. A story touching on this phase of public education is illuminating. Several years ago, when the various committees of Mr. Hoover's White House Conference on Child Health and Protection and the Committee on the Costs of Medical Care were attempting to gather statistics on the incidence of dental disease, it was found that little reliable information was available. This is hard to believe, but is true, nevertheless. All sections of the United States were canvassed for that information and many replies were received with accompanying statistical data; but when an attempt was made to analyze the data and develop them into a reliable report, we were completely baffled. It was impossible to compare any two reports and draw from them any definite conclusions. Why? Because there were no standard examination methods used. There were no standard examination record blanks, and the methods of recording the findings differed widely. In most instances, we did not know whether a nurse, hygienist, physician or dentist had made the examinations; nor was there any classification of the data on the basis of well defined age levels. In many instances, the date of the examination was not known, nor was specific information available as to the amount of educational or reparative activity that had been carried on in the various groups prior to the date of the examination. There were other important factors missing, such as the nationality and economic status of the children examined. Another difficulty was the lack of data covering a wide area such as are now being collected in Missouri. To sum up: these various records may have been of some practical value in the communities from which they came, but they possessed little worth to anyone outside. From this experience, we are convinced that if examinations and examination records are to be of practical value, there must be a universal adoption of a standardized technic for making examinations and for recording the findings. The information recorded must be sufficiently comprehensive and pertinent to make possible the intelligent interpretation of the data obtained. With such a system, dental hygiene programs will be on a par and can be evaluated scientifically as to their preventive accomplishments and their strong and weak points. Until such a system is adopted, preventive dentistry will remain a spasmodic and limited endeavor. Missouri has made a great step in the right direction by carrying on her work on a statewide basis.

There are other comments to be made on this subject of examinations and records. It does not seem that it is practical to repeat comprehensive dental examinations of large numbers of children year after year. It is true that there is a certain amount of educational value that may be attached to the dental examination of a child. But it seems that its value is insufficient to justify its constant repe-

tition over all age groups. Let us look at the matter from the standpoint of a community dental program. As an initial endeavor, in the attempt to interest the public and school officials in the establishment of a school dental program, the complete examination of all of the school children is desirable. Such records are convincing when covering an entire school system. Furthermore, they furnish us with a well-defined picture of the conditions with which we are to contend, if our program is permitted to function. Such records will also serve as a measuring rod against which we can determine the success or failure of a dental program. Now, we all know how much time and energy are required in carefully examining the teeth of a large group of children. Why not, then, in the years following the first complete examination, use the plan that is called the "screening process"? Under this plan, the children form in a line and pass by the examiner. Using only a wooden tongue depressor, the examiner glances over the teeth and gums. If he observes one spot that demands attention, the child is notified that he is in need of dental attention. If the examiner should thus examine a child and find nothing wrong, that child is placed to one side and is later given a more careful examination with a mouth mirror and an explorer. Thus, it is seen that, by this so-called screening method, much time and effort may be saved, and yet the same results are possible from the standpoint of education and correction. But we must remember that this method of examination is not recommended for the first examination, but for those that are to follow. It is also recognized that new kindergarten or first grade groups will always require the more thorough form of examination because they will not have been previously examined. For purposes of more careful checkup, in an endeavor to evaluate the results of a program, "sample examinations" can be made. By this, we mean that, instead of examining all grades carefully, we will examine, for example, the third, fifth and eighth grades or the fourth and the eighth grades. Comparison of those records with the original records will reveal to us whether or not our program is functioning successfully. Furthermore, the sample records may be compared from year to year.

In connection with the above-mentioned screening method, someone will probably raise the question, "With such a system, won't it be impossible to notify the parent as to the extent of the child's dental defects?" By way of being evasive, we might reply with this question, "Is it desirable that the parent be notified of the exact character of the child's dental defects?" We have seen enough of the difficulties which accompany notification of the parent as to the extent of the work needed that we are ready to condemn the practice. First of all, it requires a tremendous amount of clerical service. Secondly, it is apt to produce varying reactions in the mind of the parent. For example, if the child's record shows that he has a large number of teeth requiring attention, the parent may become discouraged and neglect to obtain dental service for the child; or, if the child's record shows only a few teeth in need of attention, the parent may decide that it is not important enough for serious consideration. There is another possible reaction. Suppose that Dr. Brown made the original examination and the parent takes the child to Dr. Smith for attention. Dr. Brown may have discovered eight cavities, but Dr. Smith finds ten. Immediately, the parent wonders whether Dr. Smith is honest. Possibly

Dr. Brown found eight cavities and Dr. Smith can find only six. Thus, Dr. Smith may be under suspicion as to his ability to make an acceptable examination. Other interesting reactions might be pictured, but these are sufficient to justify the contention that individual records of examination are not for public perusal. They should be available for private purposes only.

Following closely on the matter of examinations comes the problem of reparative service. It is naturally assumed that one of the objects of an examination is to encourage dental attention. Usually, the examination alone is not sufficient to produce that result. Other educational facilities must be brought to bear on the problem if results are to be obtained. However, education without repair is futile. In an entire school system, the problem of repair is not easy of solution. There is the question of care for indigent children to be considered. If a widespread program of repair is urged for all school children, there is danger that the public will accuse the sponsors of being mercenary. Furthermore, to initiate a dental program with the expressed intention of immediately eliminating dental disease from the mouths of all the school children is to assume a burden that it is practically impossible to carry from the outset; yet this is frequently the type of program attempted when wholesale examination of all school children is carried out. We become so excited over the data revealed by those examinations that we are completely carried away and we immediately make plans to do big things. We do not intelligently use the information that we have gathered as does the general who is facing a large and dangerous enemy. Instead of carefully analyzing the problem, we rush pell-mell to the attack over the entire front. As the records of numerous dental programs reveal, those attacks may continue year after year, but, for some reason or other, the enemy remains dangerously strong. What is the trouble? First, we have not concentrated our attack on one point. Secondly, a broad program of repair usually displaces to a large degree any constructive program of prevention. In other words, we have used all our forces in a broad attack and have none left to menace the enemy's flanks or sources of supply. What is the answer? Concentrate all efforts at one point and allow nothing to change our plan. Select the point of attack where the greatest possibility of success lies.

To put all this into more understandable language, we will assume that a dental program is being inaugurated in a small community. How shall we go about it? It is a common axiom in public health work that an initial demonstration shall be made only where there is the greatest possibility of success. The word "demonstration" is used advisedly, because, after all, we are attempting to demonstrate to the public that our program is sound. The point for our demonstration is selected on the basis of its probable successful conclusion because we wish to cut possible failure to a minimum. We are always measured by the extent to which we have failed rather than the degree of our success. The point of attack that is recognized as most logical is the lowest grade in the school system. It may be the kindergarten or the first grade.

Using a small community first grade as an example, let us say that, for the first year of our program, we have concentrated on the thirty or more pupils in that grade. Their teeth have been examined and their mouths placed in a healthy condition. Because we have con-

centrated on such a small group, we have only a limited number of parents to convince as to the value of dental health. We had only one teacher to educate. In such a small group, there will naturally be a limited number of indigent children for whom dental care must be furnished. We have practically eliminated any possibility of being accused of mercenary motives. And most important of all, we have reached these children at an age when preventive treatment offers the greatest possibilities. In regard to the parents of children of that age, we might add that there is no other period in his school life when the parent shows so much interest in the welfare of the child. This statement has been corroborated time and again by school nurses, physicians and dentists.

We have finished the first year of our program and the second year is upon us. What do we do? We follow the beginners group through their second year. We examine their teeth and obtain corrections of all defects. If our work was well done that first year, a minimum of repair should be necessary this second year. Now, we begin to increase our load and broaden our point of attack. We take on the new incoming first grade group. We do with them exactly what we did with the initial group. At the end of our second year, we will have two full grades of children as dentally healthy as it was possible to make them. We have educated one more teacher and an additional small group of parents. We have reemphasized to the first teacher the value of dental education, also to the first group of children and the first group of parents. Our program has not been topheavy any of the time, but has been completely under control.

We continue the plan for each succeeding year of our program, slowly broadening the line of attack and the load we must carry. If the program is thus carried on for a period of six years, the children in six complete grades should have clean, healthy mouths. Suppose that our facilities, such as time and personnel, will not permit us to go any farther nor enable us to continue to do thorough work. In that case, we should cease to take on any additional load. If we can properly care for the maximum in a certain number of grades, we should not endanger our program by attempting to handle any more. By building our program to that point and no farther, but continuing to receive each new first grade and following it through to the grade limit that our experience and common sense have dictated, we are constantly working within safe and sound boundaries.

Some might say of such a plan that it is too slow. It is slow, but it is sure—more sure than any other plan with which we are acquainted. We have seen that other type of program, which starts out so ambitiously to conquer all, accomplish little or nothing of a preventive nature, and, at the end of ten years, as deeply in the mire of reparative service as it was in the beginning. Others might raise the objection to the program suggested that it neglects all those other children who are immediately and urgently in need of attention. When we think of the millions of children in past years who have gone through the entire school system of this nation without dental attention, are we justified in criticizing a constructive effort which offers the greatest possibilities for prevention and service, even if some children do face the same suffering which they would have faced if the program had not been started? After all, emergency treatment in worthy cases must necessarily become a part of any well defined dental program; but nothing must be permitted to upset the fundamental principles upon which the

program itself is based. This may appear to be a cold blooded attitude, but if we are ever to make progress in controlling the universal plague of dental disease, we must go about it in a logical and sensible manner.

Reparative service raises another question; namely, the establishment or non-establishment of dental clinics. It has always been our contention that until service in the private dental office proves inadequate, the establishment of a dental clinic is unwarranted. For some reason or other, the dental clinic seems to be the immediate aim of most groups when they inaugurate a dental program; it matters not whether the number of patients to be reached is large or small; nor does the existence of ample private facilities seem to be considered. The ideal toward which we should strive involves leading the individual to form the habit of seeking the services available in the private office. The expense entailed in establishing a clinic will pay the private practitioner for a large amount of service to the indigent. On such a basis, each practitioner will be contributing his logical share toward the improvement of the public health. The program then becomes a general professional responsibility, which is as it should be. Furthermore, we must not lose sight of the dangers attached to clinical service, no matter in what manner it may be financed. This country is going through a period of great political unrest. There is much talk of state dentistry and "panel" dentistry in several sections of the country. It is not a long step from the public dental clinic for indigents to the dental clinic for all classes. If the dental profession in the United States is to protect itself against lay control, if it is to maintain its independence of action, if it is to remain the most progressive in all the world, encouragement of the public toward seeking service from the private practitioner must be the foremost consideration. When that service proves inadequate, there is ample time to establish the professionally controlled and carefully supervised clinic for indigent service.

There is another important factor in the establishment of a dental program: We must never lose sight of the fact that dental service is a vital part of health service. Dental disease may be the result of ill health elsewhere in the body, or it may produce ill health in some other part. Modern dental service does not limit itself to the confines of the mouth. Therefore, when we establish a dental program, we should correlate it with all the other health activities. Too often, dental programs have been set up without regard to any other health endeavors. This precludes helpful cooperation from other health groups. It invites jealousy, criticism, opposition, slow progress and possible failure. When dental service is strongly allied with all other health endeavors, it flourishes. It is a common axiom in public health work that, at the beginning of a program, we should use already established machinery as far as possible. To set up an entirely independent dental program is to disregard that well established axiom. Here again, Missouri is showing her foresight. The fact that a dentist is employed by the state board of health would indicate that. The inclusion of dental health in the "six and nine point health standards" proves it to be true. Let us hope that Missouri will never slip from that position.

In the forepart of this paper, the assertion was made that "education without repair is futile." I would add that the desire for reparative service will not become very strong without education. There are a variety of opinions as to what constitutes public education and where and how it is to be accomplished. One group maintains that newspaper publicity

will solve the problem. There is no doubt that newspaper publicity has a vital place in any educational program, but we contend that it is only a part of what should comprise our educational endeavors. "Paid for" publicity is an extremely expensive item, and when it must be carried on year after year, the sum that is necessary to maintain it becomes a staggering figure. How effective newspaper publicity can be is somewhat of a question. Health articles, if they are read at all, are read by adults. From the standpoint of prevention, it would seem that our effort in that regard would be very uncertain of results. It is a difficult thing to teach the old dog new tricks, but much good can come from the right kind of newspaper publicity. A committee selected from the members of the Board of Trustees of the American Dental Association is now studying the problem and will present a program for adoption at the annual meeting in August. This program will not call for a large expenditure of funds because the Association cannot afford it. It will be a conservative activity, yet flexible enough to permit the adoption of policies from time to time that coincide with the Association's financial capacity and with substantiated experience. One thing is certain, the committee believes that such a program should always be under the control of the Association and not in the hands of an outside organization over which we would have little or no control. Our past experiences have demonstrated the dangers of delegating our powers in that respect.

If newspaper publicity is not the solution to public education, what is the solution? Again, we come back to that public health axiom, "Use machinery that is already in existence." We have a vast public school system in this country, the function of which is to educate future citizens. Is it not logical to expect that dental health education should be one of the functions of our educational system? It is the logical point of attack. The opportunity for preventive education is ideal. There, we can present information to millions of children and develop in them the habits and the appreciation of dental health that are bound to be carried with them into manhood and womanhood. Furthermore, the easiest pathway to the education of the parent is through the child. Can we ask for a more nearly ideal situation upon which to build an educational program? It is true that all this will not come to pass without effort on our part. Much work will have to be done. Teachers must be acquainted with the fundamentals of teaching dental hygiene. It must be suggested to teacher training institutions that they develop definite courses of instruction on matters pertaining to dental health. School texts must be revised to include a reasonable amount of up-to-date dental health information. Pedagogically acceptable dental educational materials of all types must be developed and made available to the teachers of the nation at a reasonable fee for supplementary use. This will require the expenditure of money, but it will be money well spent. In addition to teacher training, the training of public health and school nurses should be greatly broadened from the standpoint of dental health. In most of the nurses' training institutions of the country, little or no dental instruction is being presented at the present time. This condition should be corrected. But all this will not be accomplished by mere talk. The dental profession in every state and community must endorse this program and convince the powers that be that such action is essential to public welfare.

There are other forms of public education which are of great importance. Lectures by members of the profession to

all types of lay audiences, radio broadcasts, exhibits at health shows and county and state fairs, the use of motion pictures and posters, all contribute an invaluable part to the program of public education; but all of this activity must be carried on constantly and with persistence. There must be no let-up. Temporary and periodic educational endeavors bear little fruit.

When we discuss education, we would be remiss if we did not include the education of the dental profession. We must have the understanding cooperation of the profession in this work if we are to go very far. The individual practitioner must appreciate his responsibility. It is useless to educate the child to seek dental service if the dentist is unwilling or unable to give him the attention to which he is entitled. Missouri is trying to overcome that difficulty. She is to be complimented for her activities in that direction and encouraged to continue them.

CONCLUSION

How is the individual dentist to benefit from all this activity? This question may infer a mercenary motive; but is it not logical that if the dentist works to improve and protect the public health, he should obtain something in return? If public education and service give the dentist the feeling that he is fulfilling his public obligation to mankind, that should not and will not be the only compensation which he will receive. He is bound to increase the number of his patients, and that means increased income. Surely, the public cannot object to that.

Let us, then, look to the future. The depressing days through which we have passed cannot last much longer. We must follow in the footsteps of the business world and lay a sound foundation for that greater and broader dentistry which is bound to come. Ours is the opportunity and the obligation. Preventive dentistry in the field of public health is the definite responsibility of every member of the dental profession. Let us present a united front, each man doing his part, all working to maintain the position of American dentistry, recognized as the leader of the world.

PUBLIC HEALTH DENTISTRY IN MISSOURI

By A. W. HERINGTON,* D.D.S., Jefferson City, Mo.

THE public health dental program in Missouri has just passed its second birthday. For several years, the public health officials of the state had visioned the necessity of including dentistry in a well-rounded program of health conservation. The program was new both to the professions and to the public and considerable time has been spent in sowing the seeds of dental health, that they might take deep root and grow. Other state programs were examined carefully, with the full realization that none of them might be feasible in Missouri. One of the first steps was to secure the cooperation of the organized dental profession of Missouri. We were assured of their cooperation and support, and a standing committee, composed of the president, president elect and secretary of the

*Public health dentist, Division of Child Hygiene, State Board of Health.

Missouri State Dental Association, was appointed with whom we might consult, asking their approval of all phases of the program before it was presented either to the profession or to the public. We have at all times outlined work ahead and submitted it to the committee for approval and, in every instance, all parties have cooperated to the fullest extent. The program was established on the following fundamental points:

1. To conduct, in connection with the general health program of the state board of health, a program of dental hygiene, with the expressed desire of stimulating early dental care and periodic dental observation by the family dentist.

2. To encourage the dental schools in the State of Missouri to include a course in public health dentistry, with special emphasis on child care, in the curriculum.

3. To establish a program of dental care sponsored by community organizations with the hope of working out a plan whereby the underprivileged child can receive adequate dental care from the local dental practitioner.

4. To encourage the dentists of the state to take a greater interest in dental prophylaxis, care of the deciduous teeth and public health dentistry.

To attain these objectives, it was necessary to establish a plan. We first presented the plan to the district dental societies, hoping to show the profession the importance of their obligation to the public and especially to children in practicing preventive dentistry. This has taken time; the job is not yet completed, and probably never will be. Yet the wonderful cooperation of the greater percentage of the dental profession is evidence of their sincerity and interest. To expedite the program and have a key man in every community, we asked the president of the state dental association to appoint a dentist in each of the 114 counties of the state who was designated county dental chairman. It was through these chairmen that we presented the program to the public.

In Missouri, the dental work is a part of the division of child hygiene which was established in 1921 and has perfected local organizations which assist in health work of all types. We took advantage of the opportunity to present the dental program to these organizations, asking their assistance in spreading the dental health message to the public. Then we have public health nurses in various parts of the state whose duty is all phases of child hygiene. In 1931, we had eighty-five public health nurses in the state outside the cities. In 1932, the number was reduced to fifty-four, owing to the retrenchment program. These nurses teach and preach dental hygiene, as it is a part of their program. Thus, through these nurses, the dental message was sent not only to many schools but also directly to the home. We have accomplished much through the parent-teacher organizations, which are familiar with the high percentage of dental defects and are always willing to cooperate in stamping out defects and building for health.

In Missouri, we do not have dental hygienists, as do many other states, neither does the state make any corrections. Our program is purely educational and demonstrational. We cooperate with the state department of education, presenting to the teachers a lecture course in the teachers' colleges and supplying them with literature on proper teachings. The dentists in many counties have made talks and used models to demonstrate dental health. Then local

dentists have assisted in examining the mouths of 250,000 grade school children in Missouri outside St. Louis and Kansas City.

In 1931, twenty counties made a complete report and fifty others made partial reports of the dental examinations. Several of these last fifty were made by the public health nurse, and, in these counties, defects did not run so high and there were a great many more standard mouths.

TABLE 1.—REPORT OF FINDINGS

Total number of children examined,	250,000
Normal mouths,	16%
Mouths immediate attention,	84%
Average defects per child,	3.8
Total number examined by dentists,	120,180
Normal mouths,	10%
Mouths immediate attention,	90%
Average defects per mouth,	4.5

Our 1932 examinations are not yet complete, as many reports are not in, but, to date, thirty-seven counties have made complete reports and forty incomplete reports. The year 1932 will run far ahead of 1931 in work accomplished all over the state, and the dentists did all the work.

The work done in thirty-seven counties is shown in Table 2.

TABLE 2.—WORK DONE IN THIRTY-SEVEN COUNTIES

Number of children examined,	65,366
Total number children with standard mouths,	7,833 (11.9%)
Average defects per month,	4.2
Number permanent teeth decayed,	86,792
Number temporary teeth decayed,	85,738

In every case, the child was given a slip of notification for parents designating whether dental attention was needed.

In addition to these examinations, the division of child hygiene conducts numerous preschool clinics, where many children are examined, mothers are given information as to the child's condition and a program is outlined for its future health and happiness. In Missouri, we offer no special award for dental corrections alone, but we do have the "six and nine point" health standards. A "six or nine point button" is awarded to all children who attain the minimum health standards. Dental health is one of the requirements for obtaining either button. The teeth must be clean, all cavities filled and the gums free from infection to obtain the six or nine point button. This has been a great aid in getting work done, as the children all want their buttons and have learned the health lesson as well. This program has been carried on in every county and even rural schools are eager for the health service. Several rural schools last year were 100 per cent nine pointers; that is, they met the requirements of the division of child hygiene on (1) nutrition; (2) posture; (3) vision; (4) hearing; (5) tooth condition; (6) throat condition; (7) diphtheria immunization; (8) smallpox vaccination; (9) birth registered.

Nine point star used to indicate the nine health standards that Missouri children are urged to attain.

To supplement this program, lectures have been given to schools, P. T. A. and other organizations. The public health

dentist has visited 389 towns and schools and given 256 lectures, to 50,673 persons. Movie films on dental health accompanied many of these lectures. Dental leaflets entitled "Toothfully Speaking," "Building Strong Baby Teeth" and "Priceless Pearls" have been distributed.

In order to acquaint the school teachers with the dental health program, the public health dentist visited the state teachers' colleges, giving illustrated lectures on dental health and how to teach the children. Diet, cleanliness and early correction were stressed. Our program has been carried on in what would be called rural Missouri, as the larger cities have programs for their needs.

We feel that our state program has been well worth while and that, through the cooperation of the dental profession in making lectures and examinations, the school children of today know a great deal more about the teeth and dental health than the parents. These children are carrying the message home to the parents and, in this way, more people are reached and much good is accomplished.

The fact that many dentists do not care to work on children, and thus parents have not been shown the necessity of caring for the baby teeth, has been a great handicap in the progress of our program.

In local communities, where necessity demanded, clinics have been established for the underprivileged children. A local organization usually sponsors the clinic and the local dental profession gives its services free. Other larger cities have either school or city clinics where the indigent receive dental care. So, for future plans, we must educate the parents to the value of early correction for prevention, and teach the children, and see that they practice, good health habits, not just teaching facts, but visualizing ideals of health that the children may voluntarily adopt the habits of healthy living in their daily program.

We must educate the parents as to what good dental service for children really means, establishing school and preschool clinics under the supervision of the dental profession, and instituting a program of dental hygiene to be carried on throughout the year, leading the children to become interested in dental health, that good, strong teeth free from disease may become a reality.

We planned to divide the state into districts and appoint part-time dental supervisors in each district, in order to expedite the program. Appropriations have been asked of the legislature for this purpose, but, owing to the necessity for the state-wide economy program, this may not be granted.

DENTAL HYGIENE IN THE STATE OF DELAWARE

By MARY ELIZABETH WAGNER,* D.H., Dover, Del.

THE Dental Hygiene Department was made possible in Delaware when the state legislature, in 1931, made a grant of a sum of money to employ a number of dental hygienists. The fund was placed under the administration of Dr. A. C. Jost, executive secretary of the state board of health. It was through the state dental society that the dental hygiene program was brought before the state legislature, and it was through the state society that success was achieved. With the aid from similar departments in other states, a program was shortly outlined. Miss Margaret Jefferies came to Delaware and rendered extremely valuable assistance in aiding the Delaware department to get under way. I undertook its supervision in August, 1931.

Delaware, the Diamond State, is mostly rural. Wilmington, the largest city of the state, has over half the population of the entire state. Rural Delaware is divided into three counties, namely, New Castle, Kent and Sussex. In view of the fact that Delaware consists mostly of rural people, though a small state, the problem was a large one. Even in this day and age of the radio and press, little thought had been given to dental hygiene.

As in all states, not only the child was to be educated to dental hygiene, but the parent as well. The problem of this state was: How, in the best way, can contact be made with the parent and the home? The contacts were not easily made as there are no street cars and buses, and only an occasional train. There were not enough cars at the hygienists' command so they could go when and where they wished. The problem was met and with success. Delaware may be proud of the work that has been done in this line of dental hygiene for the first time—not only proud of the work that has been done, but also proud of the results.

In September, 1931, six hygienists entered the employment of the state board of health. Two were placed in Sussex County; one in Kent; two in New Castle and one in the Wilmington city schools, which are self governed and independent of the state board of education. Wilmington had already a well functioning organization of dental hygienists, but one of limited staff. The hygienists cleaned and examined the teeth of the school children (including colored) that could be reached within the school year. They cleaned and examined the teeth of the children in the first three grades, and carried the educational work into the first six grades. During the examinations of the teeth, the hygienist records all conditions found in the mouth. A record is kept of the first permanent molar and the importance of saving this tooth is stressed. This record is then left at the school, and on the opening day of the next year, a check-up is made. When defects are found, the hygienist sends a card to the parent advising the work necessary. The

*Director of Dental Hygiene, Delaware State Board of Health, Oral Hygiene Division.

hygienist records even the slightest defect. Frequently, the dentist may find that the defect does not need immediate attention. This card, when signed on the reverse side by the dentist, stating that the necessary work has been completed, is returned to the school, and the child's name is put on an honor roll. To have his name in print where everyone may see it inspires the child to do everything within his power to have a perfect mouth. Unfortunately, the corps of workers is not sufficient to carry out a better and more extensive program. In February, 1932, the seventh hygienist was placed in the Wilmington schools. The eighth took up her new duties in Kent County, at the beginning of the new school year.

The hygienists had to depend on transportation of equipment from school to school by the county medical supervisor, county nurse or the dental hygiene supervisor. One car for six hygienists! Though this was one of the greatest handicaps and much time was lost, and in spite of the many other handicaps that were met with, there were few schools that did not know and have at least some contact with the dental hygiene program carried on in the state.

The first week in May, Child Health Week, Delaware had its first dental health week. The president of the Delaware Dental Hygienist's Association presented a talk over the radio. All the hygienists spent the week meeting the assemblies of all grades, in as many schools as was possible. Toothbrush drills were given, and it was not uncommon to find "the old family toothbrush" still in existence. Plays and movies concerning dental hygiene were given. Drug stores were asked to display tooth pastes, powders and brushes in their windows. Posters were also on display in these windows. Some of the druggists' displays were so arresting to the passerby, that it was necessary to stop and observe even the detail. All schools, parochial, protestant and private, celebrated dental health week. All Delaware was interested in dental hygiene for at least one week.

During the summer, the hygienists examined the teeth of the preschool child in connection with the physical examinations. It is generally felt by all that the program is one of the most important, if not the most important, step toward accomplishing our desires in this work. The hygienist can teach the foundation of the "clean teeth" habit so much earlier than the dentist can, and it can never be too early for this habit to be formed. Usually, the parent of the child is in attendance at the clinics, and the hygienist has the opportunity to instruct the parent in the home care of the mouth, both for herself and for the child present. The hygienist may also instruct the expectant mother as to the care of her mouth before and after the child is born. Although some little time passed before parents brought the children to the clinics, toward the end of the season many children had to be turned away, with the hope that the child would receive the attention in school the following months or in the next summer program. The clinics were not completely organized until from the middle of July to the end of August. We feel that success was evidenced by the number of "corrective advice" cards given and returned by September. There were 488 of these cards given and, by September, thirty-eight of these had been returned. Bear in mind that these were the first dental hygiene clinics ever held in the state. The clinics were held in the three counties.

The third week in July, the Kent-Sussex County Fair was held, in Harrington. The state board of health previously

shared their booth with the dentists of the state who offered their services. They held free dental clinics during the week and did some corrective work to those who so desired. These clinics were considered most successful. Last summer, two hygienists were on duty, cleaning and examining, of their own accord, the teeth of any child and sometimes of adults, if they wished. While one was examining and cleaning, the other explained to those interested the kind of work that was being done there as well as throughout the state. When the work was completed, the hygienist instructed the child as to the correct method of brushing the teeth. A tube of tooth paste was each child's reward. A great many questions were asked during this time. This booth was perhaps the busiest and most popular at the fair.

The general opinion is that the rural districts are the most difficult to arouse to interest in any new feature. It is felt that the rural people give all their time to their work and farms, and are satisfied with just that. The contrary has been proved in this work. These people are eager to learn and to carry on the new work. Their interest is a compliment in itself. During the first few months of the dental hygiene activities, the supervisor was kept quite busy meeting with these people, giving them a series of lectures, demonstrations and moving pictures. The meetings were held in churches, club houses and private homes. The meetings were well attended and met with great interest. The interest shown did not stop at that meeting, but many more have followed. There were also lectures given to the parent-teacher associations, throughout the state. As a result of the dental hygiene program, free dental clinics have sprung up overnight, and each one has proved a success. Teachers were met after school hours and dental hygiene was discussed, particularly dental hygiene in their state. A great many schools have raised enough funds to conduct free dental clinics in the school, the dentists giving a half a day a week of their time to afford the child every chance for a 100 per cent mouth. They are doing excellent work.

The interest shown by all left a lasting impression. Interest personally, as well as collectively, has been and is remarkable and enheartening. It would be impossible to mention all who have given us the courage to go on. Each and every one has contributed his efforts, with willingness and unfailingly. Pupil, school, teacher, principal, superintendent and director, all have supported the work. Every child has given us support. Health workers and child welfare organizations have been of great assistance, and the Delawareans' future health and happiness are in their hands. They will not fail. Dental hygienists want "A Healthy Mouth for Every Delawarean."

DO YOU HAVE SOME PRACTICAL IDEAS?

ARTICLES under the title "Do You Have Some Practical Ideas?" have appeared in the April, May and June issues of THE JOURNAL. Various comments have been received from our readers from time to time, all of a constructive character. Recently, a statement was received from a member in Kansas containing so many valuable suggestions that it is quoted herewith. The author has given it the title, "Seven in the Magazine and One in the Barrel."

"Inexperienced and unqualified as I am in advising my fellows, it requires nerve to submit ideas in answer to the plea for suggestions to help men in our profession to build their practices or to rebuild others which circumstances have wrecked. I claim no originality for the ideas—only the manner of their presentation and minor suggestions as to their application are mine.

"1. The employment of spare time in taking inventory of our assets and equipment is indeed an old idea. Too many of us have lost our perspective and acquired ingrown dispositions from the very confining and exacting nature of the work in which we engage.

"(*a*) We are given to too critical introspection, and having lost a portion of our sense of humor, take ourselves and our lesser problems too seriously. Overlooking our true place in the scheme of things, we are unable to place ourselves in our proper relation to the community in which we live. To us, taking inventory means just another session of self-inflicted curtain lectures from which we emerge with a fresh inferiority complex.

"(*b*) To the slang phrase 'rate yourself,' let me add the concrete suggestion that a new outfit of clothing, a new hat, new necktie and new footwear, have been known to hearten a man mightily. To proceed to 'rate' the office follows logically in the program. Just as most people are impressed by the personal appearance of the dentist, so are they attracted or repelled by the air and appearance of his office. 'Air' can also refer to ventilation.

"2. 'Business goes where it is invited.' Patrons, clients or patients are like customers in that they respond to hospitality; they appreciate being made to feel welcome in our offices. Make them realize that they have been missed when they have not been regular in their visits, but do not allow them to mistake these remarks for a 'scolding.' Too frequently, golf scores, race horse genealogy, market quotations, contract bridge bidding, heavyweight contenders' chances and batting averages take precedence in our office conversations over those matters of greater importance to our patients and to our cause in the campaign to make the public interested in oral health.

"3. If we would all read just the preface and the first seven pages of Howard R. Raper's book entitled 'Clinical Preventive Dentistry,' our attitude toward our work would change for the better. We would be more competent to minister to our patients because we would have in mind a part of the great idea of preventive dentistry. Rational use of the roentgen rays and the consistent follow-up or recall service for prophylactic supervision and periodic examination is heartily

recommended. If the true economy of mouth health is explained to our patients, a percentage of them will request a place for their names on our recall lists. Once there, they will be more apt to cooperate to win immunity from oral disease and tooth tragedies and become desirable patients. From such people, we all recruit our 'boosters.' Many shoppers, so called, may be converted by courtesy, frankness and tact into desirable patients. Many older and wiser men advise against making appointments for would-be patients who are suspicious, distrustful or hostile adults. Others, equally wise, say, 'Never let them out of the office without doing something for them.' One of the finest men that I ever knew, a physician who had practiced and made friends of his patients for more than fifty years, once said to me, 'When I am unable to get along with a patient, I always blame myself first. I have spent a great many hours in solitary communion with my conscience trying to learn the reason for my failure to gain their confidence or to find in myself the cause of my failure.' This old gentleman is both saint and philosopher, and I love him, respecting the man and his ideals with all my heart. Still, the feeling lingers in the back of my mind, perhaps the echo of a little selfish pride, that we sometimes rate a little higher in our community by excluding troublesome patients from our clientele.

"4. Children's dentistry is both vital to the child and necessary to the dentist. Terrible crimes have been committed against the normal development and health of children by ignorant parents and thoughtless dentists. Luther Burbank said, 'If we had paid no more attention to our plants than we have to our children, we would be living in a jungle of weeds.' There is a blot on the record of humankind represented by our inattention to the needs of children. It has always been the greatest duty of our profession to help and relieve children in dental distress. We can take small comfort from the manner in which the professions have evaded their duty and no pride in the quality of the response their cries have met. Our profession has been deaf and blind and bound by a lamentable inertia. We have, plainly, been too lazy to appreciate the wonderful benefits or to recognize our pitiful shortcomings in children's dentistry.

"The attention of all dentists should be directed to the contribution in the May, 1933, number of THE JOURNAL by Lord Riddell, London, England. The paragraphs dealing with children's dentistry in the 'Practical Ideas' article in the April number of THE JOURNAL also deserve high commendation.

"5. We may not expect the patient to master the language of our profession, to learn its definitions or to understand dentistry's intricate nomenclature. We must always try, in talking with our patients, to use terms with which they are familiar. We may speak the language of our patient without taking that attitude of superiority that we all so heartily despise in others. We do not need to be either ponderous or flippant in so wording our explanations, advice or opinions that they are within the limits of the patient's understanding. We should remember that to our patient nearly all the information we offer is new. Therefore, let us resolve to be human and humane to them all. We should avoid discussing complicated theories or controversial subjects in any form. We should not fear to admit that we do not know, when questioned about something whereof we are not informed. We should always weigh our words when talking with children. The world's prize fool is the man who thinks he can deceive

children. Nothing is ever gained in the attempt to deceive them, but when given a 'break,' they are the grandest junior partners, the best sports and the happiest cooperators we may have. Children show more genuine appreciation of our efforts to serve them than a majority of our adult patients, who take our work as a matter of course, lacking the instinctive fine perception of children.

"6. If operating hours are not all filled with appointments for regular patients, one's wife can be given oral prophylactic attention. If we are blessed with adolescent children, we can remove the amalgam from the buccal pits and occlusal fissures of the first molars and try to replace with gold foil fillings of the type that we would insert for a state examining board. We could make a denture or two for some gentle maiden aunt or for sweet charity and bask in the glow of pleasure their expressions of appreciation will bring to us. We can reclaim for ourselves that high place in the estimation of the community which would have been accorded to our grandfather had he honored the people thereof by serving them as we can today—if we will.

"7. The hole we are in is one rather of mental confusion than of purely economic origin. Our morale needs a tonic. We need to be made to feel our responsibility to the profession and to ourselves and to recognize our obligations to our patients. We should learn to meet and to take leave of our patients pleasantly; but between the times of meeting and parting, they should be given a little insight into what we would like to do for them. To permit our patients to realize their good fortune in being in good hands and that their welfare is our chief concern is a part of our duty to our patients. The public will accept the rating we give ourselves only when we regain that old time dignity which accompanies our knowledge of our assured position and the consciousness of our own worthiness to serve. Why *is* all this confusion in the Temple?

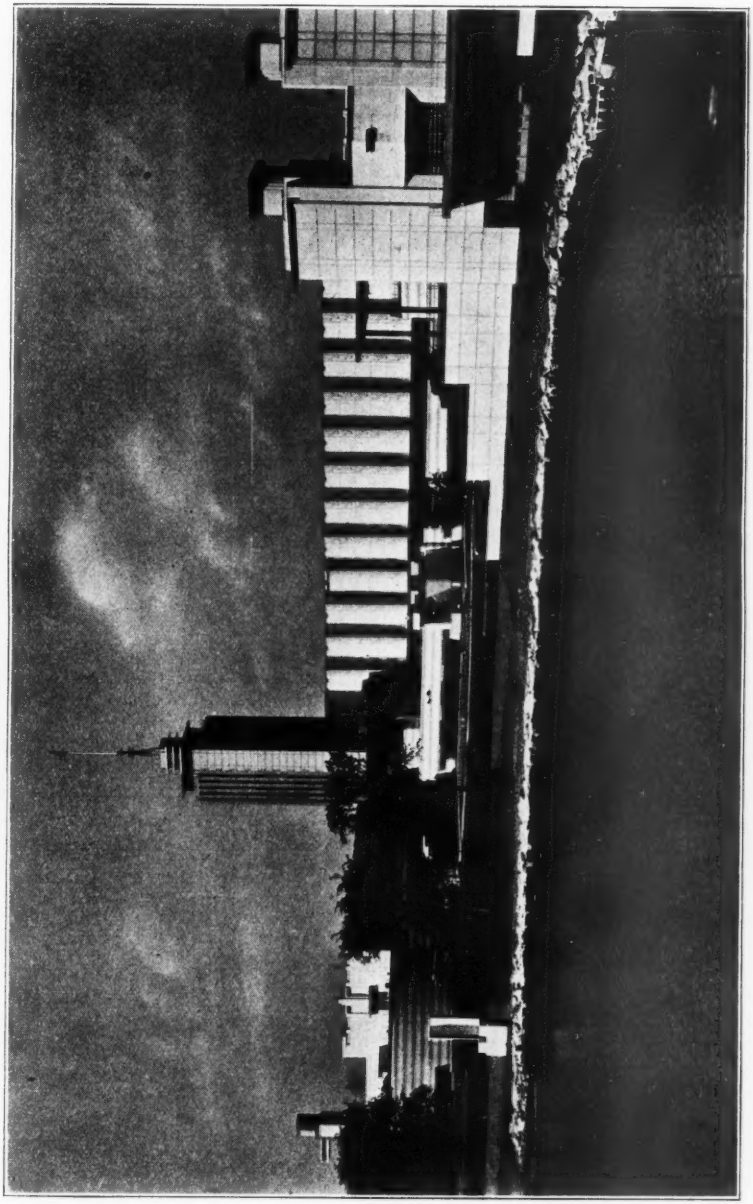
"(*a*) Since the strength of our profession depends on the strength organized dentistry can show, it behooves the individual dentist to line up with our organization. We need dental camp meetings, a dental Salvation Army to beat bass drums and shout beneath our office windows, and a revival of enthusiasm for one of the greatest of the professions—our own. The individual dentist must look to the leaders in our organization for the inspiration to pull himself out of the hole in which he finds himself. These leaders must come before the meetings of our organization, arouse the dentists to action and direct them toward higher professional ideals. Unless they do so, the individual dentist will desert his organization and his profession and the profession itself will become a dependent lesser branch of the medical profession. All officers of state and district dental organizations should read the article in the December, 1932, issue of the *Journal of Dental Research,* by William J. Gies, Ph.D., Sc.D., LL.D., entitled 'The Status of Dentistry.' A summary of this monograph would be a valuable contribution to the program of any dental meeting.

"(*b*) The future of our profession is in the hands of the people we serve. Our own recognition of the importance of our work will largely govern and measure the status of our profession in the public mind for the future. That fact of its being a most vital necessity must be conveyed by us to every one of our patients in frank language reinforced by convincing service. Our message must go out through every channel open to us. We are remiss in leaving to the makers of dentifrices, mouth washes and breath deodor-

ants the telling of our story. We have a great sermon to deliver; we must word it acceptably and present it with logic and conviction. Our health talks must be accompanied by conscientious performance of those services that we are called on to render. Our approach must be diplomatic, our messages seasoned with tact and our every gesture one of kindly consideration for the friends who sit in our chairs. The judicious use of a local anesthetic will often exert a benign influence, largely psychic but entirely favorable. The soft voice and the gentle touch will win more hearers and enlist more supporters than hours of loud harangue.

"(*c*) The individual within the profession has his salvation entirely in his own hands. The man who has ability and opportunity to enter the field of politics may find himself useful in protecting the interests of our profession in the legislative halls in the near future. If the conditions now existing in many foreign countries are to come upon us, we must be prepared to help direct and control the legislation which may affect radical changes in our conditions of practice. Our best interests will be protected by a strong organization and the active good will of a friendly public."

Electrical Building at A Century of Progress, Chicago's international exposition. This building houses exhibits portraying the generation, distribution and utilization of electricity.



The Hall of Science of A Century of Progress.

AMERICAN DENTAL ASSOCIATION SEVENTY-FIFTH ANNUAL SESSION

CHICAGO, ILLINOIS, AUGUST 7, 8, 9, 10, 11, 12, 1933

OFFICIAL CALL

To the Members of the American Dental Association:

You are hereby notified that the Seventy-Fifth Annual Session of the American Dental Association will be held at Chicago, Ill., Aug. 7-12, 1933.

The House of Delegates will convene at 10:00 a. m., Saturday, August 5; the second meeting will be held at 2:30 p. m., Saturday, August 5; the third meeting, Tuesday, August 8, at 10:00 a. m., and the fourth meeting on Thursday, August 10, at 2:30 p. m. The first and second meetings of the House of Delegates will be held in the North Ballroom of the Hotel Stevens, and the third and fourth meetings will be held in the Eighth Street Theatre. The Credentials Committee will register Delegates and Alternates, beginning at 10:00 a. m., Friday, August 4, in the North Ballroom, Hotel Stevens.

All other members will register at the Registration Office, main floor, Hotel Stevens. The Registration Department will be open from 2 to 5 p. m., Saturday, August 5 and every day during the meeting (including Sunday, August 6) from 9 a. m. to 5 p. m.

The General Meeting which constitutes the opening exercises of the Session will be held Monday, August 7, at 2:30 p. m. and the remainder of the General Meetings will be held Tuesday, August 8, 9:30 a. m., 2:30 p. m. and 7:30 p. m.; Wednesday, August 9, 9:30 a. m. and 2:30 p. m.; Thursday, August 10, 9:30 a. m., and 2:30 p. m.; Friday, August 11, 9:30 a. m. and 2:30 p. m. All General Meetings will be held in the Grand Ballroom, Hotel Stevens.

The constituent societies are hereby notified to file with the Secretary of this Association, at least thirty (30) days prior to the first day of said Annual Session, a list of the names and addresses of their Delegates and Alternates.

G. WALTER DITTMAR, *President*
HARRY B. PINNEY, *Secretary*,

GENERAL PROGRAM

Registration (House of Delegates).....Friday, August 4, 10:00 a. m.
(Also for Past Presidents, Officers, the Board of Trustees and Alternates)
(North Ballroom, Hotel Stevens)

Board of Trustees (First Meeting).....Friday, August 4, 10:00 a. m.
(Hotel Stevens)

Board of Trustees (Second Meeting).....Friday, August 4, 2:00 p. m.
(Hotel Stevens)

Registration (General).....Saturday, August 5, 9:00 a. m.
(Main Floor, Hotel Stevens)

House of Delegates (First Meeting).....Saturday, August 5, 10:00 a. m.
(North Ballroom, Hotel Stevens)

House of Delegates (Second Meeting).....Saturday, August 5, 2:30 p. m.
(North Ballroom, Hotel Stevens)

House of Delegates (Third Meeting).....Tuesday, August 8, 10:00 a. m.
(Eighth Street Theatre)

House of Delegates (Fourth Meeting).....Thursday, August 10, 2:30 p. m.
(Eighth Street Theatre)

PRELIMINARY PROGRAM FOR CHICAGO CENTENNIAL DENTAL CONGRESS IN CONJUNCTION WITH THE AMERICAN DENTAL ASSOCIATION

FIRST GENERAL MEETING

(Grand Ballroom)

MONDAY, AUGUST 7, 2:30 P. M.

Call to Order

Invocation
Rev. R. Everett Carr

Greetings by the President of the Chicago Dental Society
Howard C. Miller

Welcome to Chicago
Edward J. Kelly, Mayor

Welcome to the Century of Progress Exposition
Rufus C. Dawes, President

Introduction of representatives of the American Dental Society of Europe and other distinguished guests
Frederick B. Noyes

Response by the president of the American Dental Society of Europe
Dawson Buckley

Introduction of the president of the Congress
Hugo G. Fisher, Vice-President

Address of the president of the Congress
Arthur D. Black

Introduction of representatives of the International Dental Federation and other distinguished guests
William H. G. Logan

Response by the president of the International Dental Federation
Georges Villain

Response
Hugh S. Cumming, U. S. Public Health Service

Introduction of the President of the American Dental Association
G. G. Pritchard

Address of the President of the American Dental Association
G. Walter Dittmar

Adjournment

SECOND GENERAL MEETING

(Grand Ballroom)

TUESDAY MORNING, AUGUST 8

9:30 "Radiodontic Service in Operative Dentistry"
By Clarence O. Simpson.....St. Louis, Mo.

10:30 "Dental Research at the National Bureau of Standards"
By Wilmer Souder.....Washington, D. C.

THIRD GENERAL MEETING

(Grand Ballroom)

TUESDAY AFTERNOON, AUGUST 8

2:30 "Distinctive Values of the Functional Impression"
By R. O. Schlosser.....Chicago, Ill.

3:15 "Movements of the Mandible"
By Rupert E. Hall.....Chicago, Ill.

4:00 "Trends in Dental Practice"
By C. E. Rudolph.....Minneapolis, Minn.

FOURTH GENERAL MEETING

(Grand Ballroom)

TUESDAY EVENING, AUGUST 8, 7:30

Musical Entertainment

"A Century of Progress in the Medical Sciences"
Eben J. Carey.....Chicago, Ill.

"The Progress of Dentistry"
Howard W. Haggard.....New Haven, Conn.

FIFTH GENERAL MEETING

(Grand Ballroom)

WEDNESDAY MORNING, AUGUST 9

9:30 "Diagnosis in Fixed and Removable Dental Restorations"
By Theodore W. Maves.....Cleveland, Ohio

10:30 "Dental Caries"
By Frederick B. Noyes.....Chicago, Ill.

SIXTH GENERAL MEETING

(Grand Ballroom)

WEDNESDAY AFTERNOON, AUGUST 9

2:30 "The Growth of Dental Literature"
By C. N. Johnson.....Chicago, Ill.

3:15 "A Histologic Study of the Anatomic Structures Forming the Oral Cavity"
By William H. G. Logan.....Chicago, Ill.

4:00 "General Exodontia Procedure"
By Frank W. Rounds.....Boston, Mass.

SEVENTH GENERAL MEETING

(Grand Ballroom)

THURSDAY MORNING, AUGUST 10

9:30 "The Place of Orthodontia in the Impending Wider Health Service"
By Harry E. Kelsey.....Baltimore, Md.

10:30 "Operative Dentistry—Past and Present"
By Ralph R. Byrnes.....Atlanta, Ga.

SPECIAL MEETING

(Eighth Street Theatre)

THURSDAY MORNING, AUGUST 10

9:30 "Public Dental Service in Relation to the Public and the Profession"
By A. E. Rowlett.....Leicester, England

10:00 "The Socialization of Dentistry, Its Dangers and Its Possibilities"
By Charles F. L. Nord.....The Hague, Holland

10:30 "Legislation as a Factor in Professional Advancement"
By Homer C. Brown.....Columbus, Ohio

EIGHTH GENERAL MEETING

(Grand Ballroom)

THURSDAY AFTERNOON, AUGUST 10

2:30 "Pathologic Changes in the Dental Pulp"
By Thomas J. Hill.....Cleveland, Ohio

3:15 "The Sun and Toothdrawing"
By Lilian Lindsay.....London, England

4:00 "Lay Dental Health Education"
By George H. Wandel.....Chicago, Ill.

NINTH GENERAL MEETING

(Grand Ballroom)

FRIDAY MORNING, AUGUST 11

9:30 "An Evaluation of the Concept of Focal Infection"
By Edward H. Hatton.....Chicago, Ill.

10:30 "The Aims and Accomplishments of the Research Commission"
By C. T. Messner.....Washington, D. C.

TENTH GENERAL MEETING

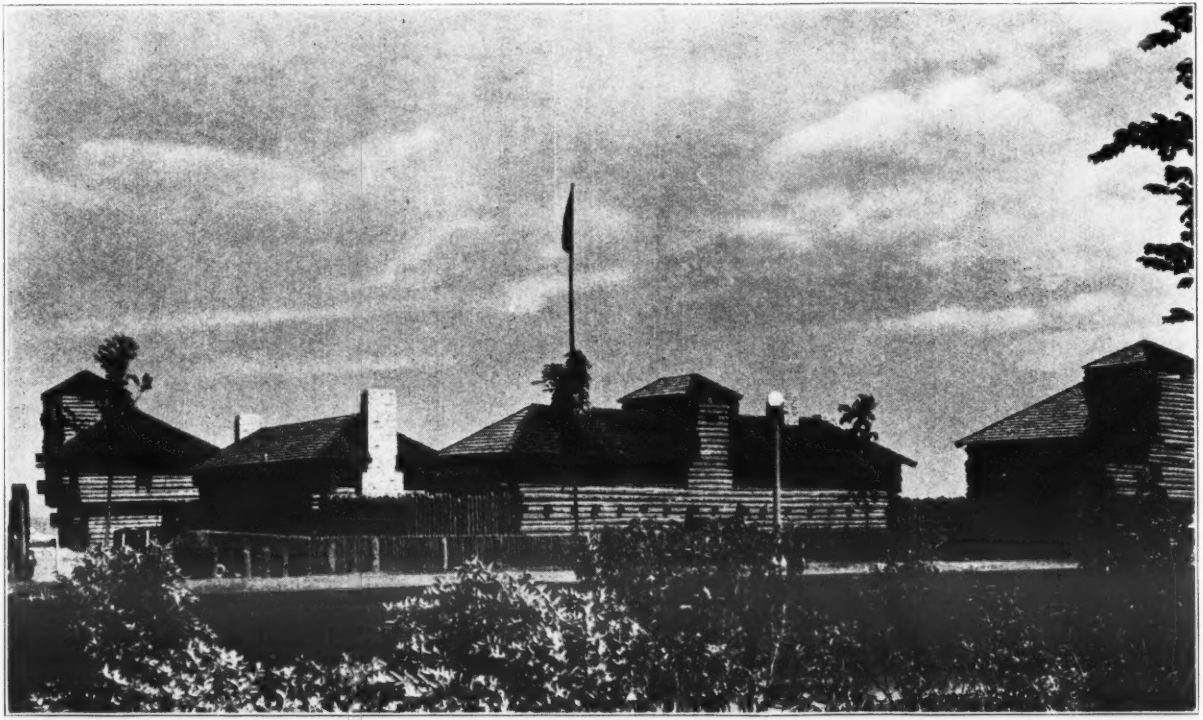
(Grand Ballroom)

FRIDAY AFTERNOON, AUGUST 11

2:30 "Dentistry in the Program for Child Welfare"
By Guy S. Millberry.....San Francisco, Calif.

3:15 "The Maintenance of a Family Dental Practice"
By Edward J. Ryan.....Chicago, Ill.

4:00 "The Council on Dental Therapeutics"
By U. Garfield Rickert.....Ann Arbor, Mich.



"Fort Dearborn," built for A Century of Progress Exposition according to the specifications for the original fort, whose inhabitants were victims of the Dearborn Massacre in 1812.

THE SCIENTIFIC SECTIONS

MONDAY, AUGUST 7

OPERATIVE DENTISTRY, MOUTH HYGIENE AND PREVENTION

(North Ballroom)

11 a. m.

"The Attainment of the Scientific Concept in Operative Dentistry"
By Frederick S. McKay.....New York City

FULL DENTURE PROSTHESIS

(North Lounge Room)

11 a. m.

"Advancements in Full Denture Construction"
By Earle S. Smith.....Iowa City, Iowa

PARTIAL DENTURES, CROWN AND BRIDGE AND CERAMICS

(South Lounge Room)

11 a. m.

"The Development of Dental Restorations"
By Frederick W. Hinds..Dallas, Texas

ORAL SURGERY, RADIOLOGY AND ANESTHESIA

(Upper Tower Room)

11 a. m.

"The Progress of a Century in Oral Surgery, Anesthesia and Roentgenology"
By Chalmers J. Lyons.....Ann Arbor, Mich.

ORTHODONTIA

(Lower Tower Room)

11 a. m.

"An Historical Résumé of Orthodontics"
By Bernhard Wolf Weinberger.....New York City

ORAL PATHOLOGY AND THERAPEUTICS

(South Ballroom)

11 a. m.

"The Treatment and Filling of Root Canals in the Past Century"
By John P. Buckley...Hollywood, Calif.

BIOLOGIC SCIENCES AND RESEARCH

(West Ballroom)

11 a. m.

"The Progress of Dental Research"
By George B. Denton.....Chicago, Ill.

TUESDAY, AUGUST 8

OPERATIVE DENTISTRY, MOUTH HYGIENE AND PREVENTION

(North Ballroom)

9:30 a. m.

"Gold Inlays"
By John Scholten...Cedar Rapids, Iowa

10:30 a. m.

"The Use of Porcelain As a Filling Material"
By J. Raymond Gill.....San Francisco, Calif.

FULL DENTURE PROSTHESIS

(North Lounge Room)

9:30 a. m.

"Functional Impressions for Complete Edentulous Cases"
By E. L. Richey.....Chicago, Ill.

10:30 a. m.

"Impressions for Complete Artificial Dentures"
By Henry Glupker.....Chicago, Ill.

PARTIAL DENTURES, CROWN AND BRIDGE AND CERAMICS

(South Lounge Room)

9:30 a. m.

"Partial Dentures: The Biomechanical Control of Design"
By F. C. Elliott.....Houston, Texas

10:30 a. m.

"Slice Type Abutment for Fixed Bridgework"
By Karl W. Knapp.....New York City

ORAL SURGERY, RADIOLOGY AND ANESTHESIA

(Upper Tower Room)

9:30 a. m.

"The Dentist in Group Medicine"
By Boyd S. Gardner...Rochester, Minn.

10:30 a. m.

"Cysts and Neoplasms of the Jaws"
By Carl W. Waldron.....
.....Minneapolis, Minn.

ORTHODONTIA
(Lower Tower Room)

9:30 a. m.

"The Twin Wire Automatic Appliance"
By Joseph E. Johnson...Louisville, Ky.

10:30 a. m.

"The Practicability of Intercepting Malocclusion"
By R. C. Willett.....Peoria, Ill.

ORAL PATHOLOGY AND THERAPEUTICS
(South Ballroom)

9:30 a. m.

"The Surgical Treatment of Periodontoclasia"
By Olin Kirkland....Montgomery, Ala.

10:30 a. m.

"Gingival Stimulation"
By Benjamin Tishler.....Boston, Mass.

BIOLOGIC SCIENCES AND RESEARCH
(West Ballroom)

9:30 a. m.

"A Study of the Teeth of School Children Previously Examined for Rickets"
By Bert G. Anderson.....
.....New Haven, Conn.

10:30 a. m.

"The Minute Anatomy of Denture Bearing Areas"
By E. C. Pendleton.....Chicago, Ill.

OPERATIVE DENTISTRY, MOUTH HYGIENE AND PREVENTION
(North Ballroom)

2:30 p. m.

"Prevention Obtainable in Systematized Treatment of Children's Teeth"
By Henry A. Honoroff....Chicago, Ill.

3:15 p. m.

"Some Phases of Recent Dental Developments in Japan"
By T. Okumura.....Tokyo, Japan

4:00 p. m.

"Studies in the Scientific Feeding of Children"
By Lydia J. Roberts.....Chicago, Ill.

FULL DENTURE PROSTHESIS
(North Lounge Room)

2:30 p. m.

"The Reception and Preparation of the Patient for Full Denture Service"
By A. P. O'Hare.....St. Louis, Mo.

3:15 p. m.

"Examination and Diagnosis in Full Denture Service"
By Robert R. Gillis.....Hammond, Ind.

4:00 p. m.

"Impressions for Dentures"
By Russell W. Tench...New York City

PARTIAL DENTURES, CROWN AND BRIDGE AND CERAMICS
(South Lounge Room)

2:30 p. m.

"The Determination of Types of Prosthetic Restorations"
By James K. Burgess...New York City

3:15 p. m.

"Esthetic Value of Porcelain in Fixed Bridge Restorations"
By J. E. Argue.....Seattle, Wash.

4:00 p. m.

"An Accurate New Technic for Obtaining Balanced and Functional Occlusion"
By F. S. Meyer.....Minneapolis, Minn.

ORAL SURGERY, RADIOLOGY AND ANESTHESIA
(Upper Tower Room)

2:30 p. m.

"Recent Developments in Focal Infection"
By Wilber E. Post.....Chicago, Ill.

3:15 p. m.

"Acute Oral Infections and Postextraction Complications"
By S. L. Silverman.....Atlanta, Ga.

4:00 p. m.

"Osteomyelitis of the Jaws"
By Henry S. Dunning...New York City

ORTHODONTIA
(Lower Tower Room)

2:30 p. m.

"The Application of Biologic Principles to Orthodontia"
By Allan G. Brodie.....Chicago, Ill.

3:15 p. m.

"The Development of Mechanical Treatment of Malocclusion"
By Chester F. Wright..South Bend, Ind.

4:00 p. m.

"Metallurgy and Its Relation to Orthodontia"
By Sigmund F. Bradel...Richmond, Va.

ORAL PATHOLOGY AND THERAPEUTICS

(South Ballroom)

2:30 p. m.

"Etiology and Treatment of Periodontoclasia"
By Arthur H. Merritt...New York City

3:15 p. m.

"The Relation of Diet to Dental Caries"
By Harold F. Hawkins.....
.....Los Angeles, Calif.

4:00 p. m.

"Bacteriologic and Immunologic Studies of Dental Caries"
By Philip Jay.....Ann Arbor, Mich.

BIOLOGIC SCIENCES AND RESEARCH

(West Ballroom)

2:30 p. m.

"Studies of the Innervation of the Teeth"
By William F. Windle.....Chicago, Ill.

3:15 p. m.

"Surgical Diathermy in Periapical Disturbances"
By E. Feiler.....Frankfurt, Germany

4:00 p. m.

"The Properties of Silicious Cements"
By K. W. Ray.....Chicago, Ill.

WEDNESDAY, AUGUST 9

OPERATIVE DENTISTRY, MOUTH HYGIENE AND PREVENTION

(North Ballroom)

2:30 p. m.

"A Comparative Study of Slice and Box Cavity Preparations"
By W. L. Wylie.....Cleveland, Ohio

3:15 p. m.

"Conception and Correction of the Locked Bite"
By J. A. Loughry.....Cleveland, Ohio

4:00 p. m.

"Local Anesthesia As Applied to the Child"
By C. W. Hagan.....Pittsburgh, Pa.

FULL DENTURE PROSTHESIS

(North Lounge Room)

2:30 p. m.

"Temporary and Permanent Baseplates"
By Richard H. Kingery.....
.....Ann Arbor, Mich.

3:15 p. m.

"The Restoration of Lost Facial Dimension and Facial Harmony"
By J. W. Crawford...Milwaukee, Wis.

4:00 p. m.

"The Registration and Record of Jaw Relations"
By F. M. Hight.....Houston, Texas

PARTIAL DENTURES, CROWN AND BRIDGE AND CERAMICS

(South Lounge Room)

2:30 p. m.

"Protection of the Dental Pulp"
By Robert G. Kesel.....Chicago, Ill.
Robert M. Stephan.....Chicago, Ill.

3:15 p. m.

"Consideration of Abutments and Removable Attachments"
By Rolland R. Jones..Minneapolis, Minn.

4:00 p. m.

"Indications for Fixed Bridgework and Construction of Abutment Pieces"
By R. J. Rinehart.....Kansas City, Mo.

ORAL SURGERY, RADIOLOGY AND ANESTHESIA

(Upper Tower Room)

2:30 p. m.

"Oral Roentgenology and Its Possibilities"
By Leroy M. Ennis....Philadelphia, Pa.

3:15 p. m.

"Abnormalities of the Mandibular Articulation"
By David J. Goodfriend.....
.....Philadelphia, Pa.

4:00 p. m.

"Cleft Lip and Palate Surgery"
By A. L. Frew.....Dallas, Texas

ORTHODONTIA

(Lower Tower Room)

2:30 p. m.

"Endocrines in Relation to Development of Jaws and Teeth"
By Isaac Schour.....Chicago, Ill.

3:15 p. m.

"The Last One Hundred Years in the Study of Bone"
By Arthur W. Ham....Toronto, Canada

4:00 p. m.

"One Hundred Years of Orthodontia in Europe"
By Georges Villain.....Paris, France

ORAL PATHOLOGY AND THERAPEUTICS
(South Ballroom)

2:30 p. m.

"The Finer Anatomy of Root Canals"
By Walter Hess....Zurich, Switzerland

3:15 p. m.

"Histopathology of the Dentin and Enamel"
By Theodore B. Beust...Louisville, Ky.

4:00 p. m.

"Treatment of Periapical Infection by Conservative Methods"
By Louis I. Grossman..Philadelphia, Pa.

BIOLOGIC SCIENCES AND RESEARCH
(West Ballroom)

2:30 p. m.

"Further Studies in Mottled Enamel"
By Margaret C. Smith....Tucson, Ariz.

3:15 p. m.

"Lips and Tongue as Reservoirs for Oral Bacteria"
By Lloyd H. Arnold.....Chicago, Ill.

4:00 p. m.

"Ultraviolet Rays, with Special Reference to Dentistry"
By A. Bachem.....Chicago, Ill.

THURSDAY, AUGUST 10

OPERATIVE DENTISTRY, MOUTH HYGIENE AND PREVENTION
(North Ballroom)

9:45 a. m.

"The Zinc Phosphate Cements — Physical Properties and a Rational Technic"
By George C. Paffenbarger.....
.....Washington, D. C.
William T. Sweeney..Washington, D. C.

10:30 a. m.

"Studies in the Self Selection of Diet by Young Children"
By Clara M. Davis.....Chicago, Ill.

FULL DENTURE PROSTHESIS
(North Lounge Room)

9:30 a. m.

"The Registration of Functional Jaw Relations"
By C. J. Stansbery..Los Angeles, Calif.

10:30 a. m.

"Immediate Full Denture Service"
By Sidney S. Jaffee..Washington, D. C.

PARTIAL DENTURES, CROWN AND BRIDGE CERAMICS
(South Lounge Room)

9:30 a. m.

"Jaw Movements and Posterior Jacket Crown Restorations"
By E. L. Pilkington.....Detroit, Mich.

10:30 a. m.

"Factors in Bridge Prosthesis"
By Arthur O. Klaffenbach.....
.....Iowa City, Iowa

ORAL SURGERY, RADIOLOGY AND ANESTHESIA
(Upper Tower Room)

9:30 a. m.

"Treatment of Fractures of Maxilla and Mandible and Other Bones of the Face"
By Paul J. Aufderheide, Cleveland, Ohio

10:30 a. m.

"Reconstructive Plastic and Oral Surgery"
By Arthur E. Smith, Los Angeles, Calif.

ORTHODONTIA
(Lower Tower Room)

9:30 a. m.

"The Orthodontic Value of Cephalometric Roentgenograms"
By B. Holly Broadbent..Cleveland, Ohio

10:30 a. m.

"Appliance Designing"
By Ernest N. Bach.....Toledo, Ohio

ORAL PATHOLOGY AND THERAPEUTICS
(South Ballroom)

9:30 a. m.

"The Conservative Treatment of the Periodontal Pocket"
By Joseph R. Walsh..East Orange, N. J.

10:30 a. m.

"The Therapeutic Treatment of Root Canals"
By Raymond L. Girardot, Detroit, Mich.

BIOLOGIC SCIENCES AND RESEARCH
(West Ballroom)

9:30 a. m.

"The Practical Value of Research Data on Gold Alloys"
By Stanley D. Tylman.....Chicago, Ill.

10:30 a. m.

"Some Unknowns in the Physiology of the Teeth"
By A. J. Carlson.....Chicago, Ill.

OPERATIVE DENTISTRY, MOUTH HYGIENE AND PREVENTION
(North Ballroom)

2:30 p. m.

"Treatment of Proximal Cavities in the Anterior Teeth with Gold Foil"
By W. I. Ferrier.....Seattle, Wash.

3:15 p. m.

"Controlling Factors in the Manipulation of Gold Foil"
By Leroy L. Hartman...New York City

4:00 p. m.

"Roentgenographic Studies During Childhood"
By George E. Morgan, Milwaukee, Wis.

FULL DENTURE PROSTHESIS
(North Lounge Room)

2:30 p. m.

"The Selection and Arrangement of Artificial Teeth"
By B. L. Hooper.....Lincoln, Nebr.

3:15 p. m.

"The Essential Factors in the Trial Denture"
By Victor H. Sears.....New York City

4:00 p. m.

"Consideration of Newer Base Materials"
By William Denton Taylor.....
.....Newark, N. J.

PARTIAL DENTURES, CROWN AND BRIDGE AND CERAMICS
(South Lounge Room)

2:30 p. m.

"Survey and Design in Partial Dentures"
By F. Ewing Roach.....Chicago, Ill.

3:15 p. m.

"A Résumé of Porcelain Jacket Crown Preparation"
By Harold W. Oppice.....Chicago, Ill.

4:00 p. m.

"Esthetics in Restorative Procedures"
By William D. Vehe, Minneapolis, Minn.

ORAL SURGERY, RADIOLOGY AND ANESTHESIA
(Upper Tower Room)

2:30 p. m.

"Unerupted and Impacted Teeth"
By Carl D. Lucas...Los Angeles, Calif.

3:15 p. m.

"Immediate Denture Service and Its Surgical Requirements"
By Dayton D. Campbell.....
.....Kansas City, Mo.

4:00 p. m.

"A Résumé of Local Anesthesia in Dentistry"
By Theodor Blum.....New York City

ORTHODONTIA
(Lower Tower Room)

2:30 p. m.

"The Rôle of Biometry in Orthodontic Research"
By Wilton Marion Krogman.....
.....Cleveland, Ohio

3:15 p. m.

"Heredity and Its Influence on Orthodontia"
By Merle C. Coulter.....Chicago, Ill.

4:00 p. m.

"Diet and Bone Development"
By William J. Corcoran...Chicago, Ill.

ORAL PATHOLOGY AND THERAPEUTICS
(South Ballroom)

2:30 p. m.

"Calcium and Phosphorus Metabolism in Dystrophic Paradentosis"
By Hermann Becks.....
.....San Francisco, Calif.

3:15 p. m.

"Notes on the Somatology and Pathology of Ancient Egypt"
By R. Wood Leigh...Fort Omaha, Nebr.

4:00 p. m.

"Vincent's Infection of the Mouth"
By Isador Hirschfeld...New York City

BIOLOGIC SCIENCES AND RESEARCH
(West Ballroom)

2:30 p. m.

"The Foundations of Mandibular Movements"
By Hugh W. MacMillan.....Cincinnati, Ohio

3:15 p. m.

"The Place of Physiology in Dental Teaching"
By Maurice Visscher.....Chicago, Ill.

4:00 p. m.

"The Resemblance of Certain Hypophyseal Growths to Tumors of the Jaws"
By E. B. Fink.....Chicago, Ill.

FRIDAY, AUGUST 11

OPERATIVE DENTISTRY, MOUTH HYGIENE AND PREVENTION
(North Ballroom)

9:30 a. m.

"Gold Inlays"
By Dale H. Snyder.....Chicago, Ill.

10:30 a. m.

"The Ideal Amalgam Restoration"
By Harold E. Tingley.....Boston, Mass.

FULL DENTURE PROSTHESIS
(North Lounge Room)

9:30 a. m.

"The Arrangement of Artificial Teeth in Full Dentures"
By E. J. Farmer.....Buffalo, N. Y.

10:30 a. m.

"Model Making by Electrodeposition"
By Charles Lane.....Detroit, Mich.

PARTIAL DENTURES, CROWN AND BRIDGE AND CERAMICS
(South Lounge Room)

9:30 a. m.

"Principles of Partial Denture Design"
By Walter E. Chapelle...Buffalo, N. Y.

10:30 a. m.

"Cast Attachments for Bridgework Using Vital Teeth"
By O. G. Krause.....Milwaukee, Wis.

ORAL SURGERY, RADIOLOGY AND ANESTHESIA
(Upper Tower Room)

9:30 a. m.

"General Anesthesia in Dentistry"
By E. I. McKesson.....Toledo, Ohio

10:30 a. m.

"Traumatism of the Face and Jaws"
By V. H. Kazanjian.....Boston, Mass.

ORTHODONTIA
(Lower Tower Room)

9:30 a. m.

"Technic in the Use of Plaster of Paris"
By Edward J. Gromme, Cincinnati, Ohio

10:30 a. m.

"Responsibilities in Dental Services"
By O. W. Brandhorst....St. Louis, Mo.

ORAL PATHOLOGY AND THERAPEUTICS
(South Ballroom)

9:30 a. m.

"The Value of Bacterial Culturing in Pulp Canal Therapy"
By Alfred Walker.....New York City

10:30 a. m.

"Technic of the Surgical Treatment of Pyorrhea"
By G. R. Lundquist.....Chicago, Ill.

BIOLOGIC SCIENCES AND RESEARCH
(West Ballroom)

9:30 a. m.

"Studies in Local Anesthesia"
By L. S. Fosdick.....Chicago, Ill.
H. L. Hansen.....Chicago, Ill.
F. H. Borg.....Chicago, Ill.

10:30 a. m.

"Experimental Dental Caries in Rats"
By Theodor Rosebury...New York City
Maxwell Karshan...New York City
Genevieve Foley....New York City

OPERATIVE DENTISTRY, MOUTH HYGIENE AND PREVENTION
(North Ballroom)

2:30 p. m.

"The Preservation of the Dental Pulp"
By Warren Willman.....Chicago, Ill.

3:15 p. m.

"Causes of Failure in Amalgam Restorations"
By Robert K. Baxter.....Chicago, Ill.

4:00 p. m.

"Teaching Mouth Hygiene to Children"
By Gladys Eyrich.....Jackson, Miss.

FULL DENTURE PROSTHESIS

(North Lounge Room)

2:30 p. m.

"Applied Psychology in Full Denture Prosthesis"
By H. B. Washburn.....St. Paul, Minn.

3:15 p. m.

"Establishing Balanced Articulation in Artificial Dentures"
By Charles E. Luce, Stuttgart, Germany

4:00 p. m.

"Biologic Considerations in Full Denture Prosthesis"
By Walter H. Wright...Pittsburgh, Pa.

PARTIAL DENTURES, CROWN AND BRIDGE AND CERAMICS

(South Lounge Room)

2:30 p. m.

"The Pontic in Fixed Bridgework"
By Donald E. Smith..Los Angeles, Calif.

3:15 p. m.

"The Excursion Bite for Partial Restorations"
By Richard L. Simpson..Richmond, Va.

4:00 p. m.

"Physiologically Functioning Saddles with Precision Attachments"
By S. Marshall Weaver, Cleveland, Ohio

ORAL SURGERY, RADIOLOGY AND ANESTHESIA

(Upper Tower Room)

2:30 p. m.

"Trigeminal Neuralgia"
By Loyal Davis.....Chicago, Ill.

3:15 p. m.

"Preoperative and Postoperative Care of Extraction Cases"
By Henry B. Clark.....St. Paul, Minn.

4:00 p. m.

"Management of Difficult Extractions"
By Joseph P. Wahl...New Orleans, La.

ORTHODONTIA

(Lower Tower Room)

2:30 p. m.

"The Development of Orthodontic Education"
By Samuel J. Lewis.....Detroit, Mich.

3:15 p. m.

"An Analysis of the Overbite Problem"
By Robert H. W. Strang.....
.....Bridgeport, Conn.

4:00 p. m.

"Photography and Roentgenography as Applied to Orthodontia"
By Leland R. Johnson.....Chicago, Ill.

ORAL PATHOLOGY AND THERAPEUTICS

(South Ballroom)

2:30 p. m.

"Dermatologic Lesions of the Oral Cavity"
By Edward A. Oliver.....Chicago, Ill.

3:15 p. m.

"Roentgenographic Studies of Periodontal Disease"
By Henry Cline Fixott...Portland, Ore.

4:00 p. m.

"Ultraviolet Rays in Oral Lesions"
By Frederick W. Lake....Boston, Mass.

BIOLOGIC SCIENCES AND RESEARCH

(West Ballroom)

2:30 p. m.

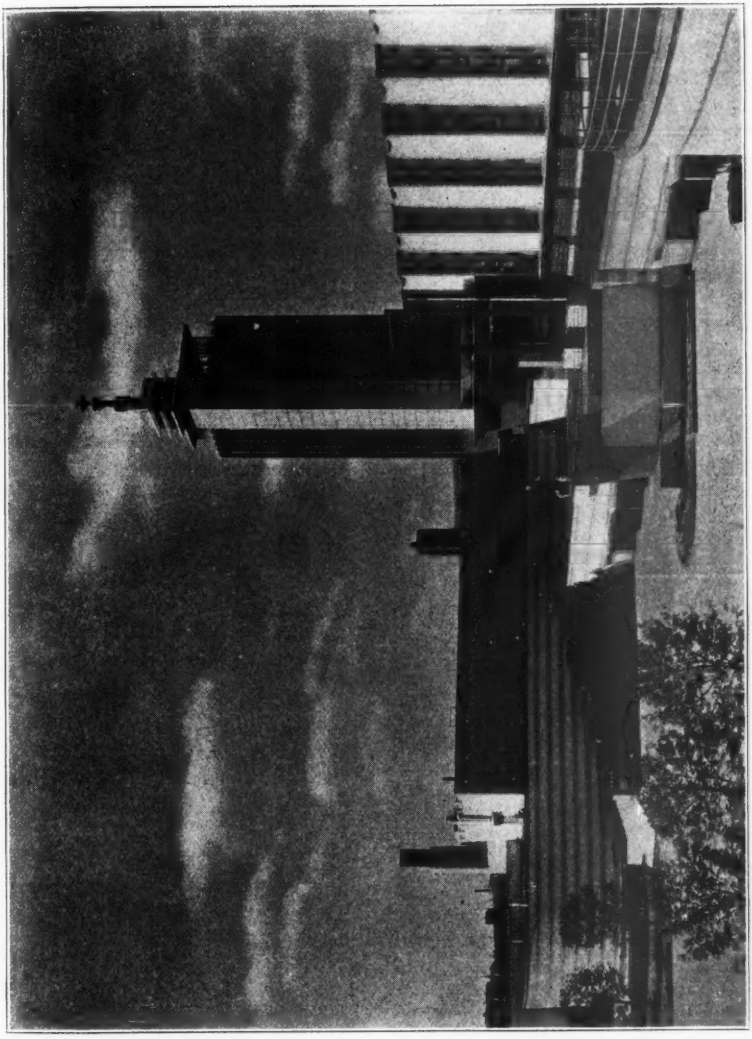
"A Clinical Pathologic Study of Pulp Amputation"
By Robert Kronfeld....Vienna, Austria

3:15 p. m.

"The Nature of the Enamel Matrix at Different Ages"
By Samuel W. Chase...Cleveland, Ohio.

4:00 p. m.

"Effects of Tooth Movements"
By O. H. Stuteville.....Evanston, Ill.



Carillon Tower of the Hall of Science, A Century of Progress Exposition.

GENERAL CLINIC PROGRAM

SECTION CLINICS

WEDNESDAY MORNING, AUGUST 9

Operative Dentistry, Mouth Hygiene and Prevention

(North Ballroom)

"Gold Castings"
John J. Ryan.....Mt. Vernon, Wash.

"Indirect Gold Inlay Technic"
Eugene M. Clifford.....Hartford, Conn.

"Direct Inlays Without the Use of Pins"
C. R. McKemie.....Albany, Ga.

"Elimination of Guesswork When Casting to Dimension"
Eric Beringer.....Waco, Tex.

"Modern Indirect Gold Inlay Technic"
Thomas P. Fox.....Philadelphia, Penn.
Harold C. Grant....Philadelphia, Penn.

"The Cast Gold Inlay"
Utah State Inlay Clinic
William Wood.....Salt Lake City, Utah
D. A. Jones.....Salt Lake City, Utah
E. A. Hunt.....Salt Lake City, Utah
Ralph L. Folsom....Salt Lake City, Utah

"Manipulation and Practical Uses of Gold Foil" (A chair clinic)
The Woodbury Study Club
C. E. Woodbury....Council Bluffs, Iowa
W. F. Hemphill.....Blair,Nebr.
L. R. Kling.....Wahoo, Nebr.
J. G. Colgan.....McCook, Nebr.
E. J. LaPorte.....Omaha, Nebr.
H. J. Bolks.....Sioux City, Iowa
J. H. Davis.....Sioux City, Iowa
H. D. Coy.....Hamburg, Iowa
F. W. Schaefer.....Omaha, Nebr.
H. A. Merchant.....Omaha, Nebr.
L. E. Myers.....Omaha, Nebr.
Guy L. Spencer.....Lincoln, Nebr.
Fred H. Waters.....Ames, Iowa

"Construction and Use of Celluloid Matrix for Cervical Silicate Cement Fillings"
John H. Greene.....Philadelphia, Pa.

"The Manipulation of Alloy for Amalgam Fillings"
J. G. Coggan.....Ann Arbor, Mich.

"Amalgam Fillings"
F. W. Herbine.....Reading, Pa.

"Amalgam Restorations as Compared with Silver Fillings"
Alvah C. Thompson....Portland, Maine

"Occlusal Reconstruction and Bite Coordination"
E. E. Bailey.....Denver, Colo.

"Preoperative Diagnosis with Special Reference to Occlusal Reconstruction"
Stuart E. Hays.....San Antonio, Texas

"Demonstrating Models in Operative Dentistry"
C. W. Strosnider.....Columbus, Ohio

"Roentgen-Ray Interpretation for Operative Dentistry"
M. Lee Tarno.....Erie, Penn.

"Treatment for Incipient Caries"
Hugh K. Kellogg.....Louisville, Ky.

"Inlays, Bridges and Space Retainers for Children"
Claude W. Bierman.....
.....Minneapolis, Minn.

"Treatment of Infected Deciduous Teeth"
John E. Gurley....San Francisco, Calif.

"Operative Procedures for Children's Dentistry"
F. E. Hogeboom.....Los Angeles, Calif.

"Practical Children's Dentistry"
Walter T. McFall.....Macon, Ga.

"Treatment of Fissures in First Permanent Molars"
John M. Clayton.....Kansas City, Mo.

"Dentistry for Children at the Child Research Clinic of New York University"
H. Shirley Dwyer.....Brooklyn, N. Y.

"Cavity Preparation in Deciduous Teeth and Methods of Treating Initial Caries"
William S. Grabow.....Chicago, Ill.

"Practical Dentistry for Children"
Samuel D. Harris.....Detroit, Mich.

"The Composition and Utilization of Intermediary Varnishes"
Ralph C. Cooley.....Houston, Texas

"Prosthesis, an Important Factor in Dentistry for Children"
A. A. Plagman.....Davenport, Iowa

"Amalgam Fillings"
Melvin J. Thompson.....Chicago, Ill.

"Methods of Reproducing Occlusal Anatomy"
R. F. Calkins.....Dallas, Texas

"Amalgam Technic"
L. I. Carlsen.....San Francisco, Calif.

Full Denture Prosthesis

(North Lounge Room)

"Methods Used in Obtaining the Functional Occlusal Path"
F. W. Hinds.....Dallas, Texas

"Restoration of Facial Contour by Use of Preextraction Records"
R. A. Stratton.....Huron, S. D.

"A New Technic for Handling Thermoplastic Materials for Dentures"
L. W. Wasbotten....Minneapolis, Minn.
Lawrence E. Spear..Minneapolis, Minn.

"Lower Denture Outline Form; Balanced Tissues Under Bases; Posterior Tooth Arrangement"
R. L. Christy.....Denver, Colo.

"The Second Pressure System of Utilizing Atmospheric Pressure for the Retention of Full Lower Dentures"
D. H. Young.....Attica, N. Y.

"Technical Procedures in Denture Prosthesis"
Walter H. Wright.....Pittsburgh, Pa.
Howard W. Bradley.....Pittsburgh, Pa.
Robert I. Crumpton.....Pittsburgh, Pa.
Roscoe A. Gougler.....Pittsburgh, Pa.

"Full Dentures, Stressing Retention of the Lower"
W. D. Clark.....Hamilton, Canada

"Roofless Dentures"
George L. Wood.....Genesso, Ill.

"The Occlusal Plane and Its Relation to Full Upper and Lower Dentures"
Richard L. Simpson.....Richmond, Va.

"Eliminating Objections to Vulcanite by Correct Vulcanization"
Robert N. Harper.....Danville, Va.

"Full Denture Technic"
Homer Simpson.....Dallas, Texas

"Immediate Denture Construction"
Douglas F. Pincock.....Ogden, Utah
R. B. Petty.....Ogden, Utah

"Full Upper and Lower Denture Impressions —Neil Technic"
Ray W. Ellis.....Salem, S. D.

Partial Dentures, Crown and Bridge and Ceramics

(South Lounge Room)

"Fixed Removable Bridges with Cast Dummies and Cast Gold Shell Crowns"
F. O. Alford.....Charlotte, N. C.

"The Porcelain Jacket Crown"
E. Bruce Clark.....Uniontown, Pa.

"Porcelain Thimble Bridgework"
George M. Prince.....Pasadena, Calif.

"An Electrochemical Process of Making Castings"
Elmer H. Berryman, San Francisco, Calif.

"Esthetic Restorations with Porcelain"
L. Z. McClurn.....Birmingham, Ala.

"One Piece Cast Pinlays; Cast Core for Jacket Crowns; Cast Base Post for Detachable Crowns"
R. E. Groetzinger.....Chicago, Ill.

"Waxing Technic for Removable Castings"
Benjamin Krohn.....Chicago, Ill.

"An Improved Movable Attachment in Fixed Bridgework"
Frank C. Starr.....Columbus, Ohio

"A Dummyless Fixed Bridge"
B. F. Sapienza.....Birmingham, Ala.

"The Contiguous Clasp"
M. M. DeVan.....Philadelphia, Pa.

"Durable, Sanitary, Esthetic and Time-Saving Construction of Onlays, Eliminating Cutting Distal Interproximal Surfaces"
M. F. Jarrell.....Alexandria, La.

"Porcelain Jackets and Wing Bridges"
Thomas B. Sharp.....Atlanta, Ga.

"A Rapid Technic for Casting Three-Quarter Mesioclusodistal and Full Crowns"
H. G. Tarbell.....Watertown, S. D.

"Porcelain Faced Gold Jacket Crown"
Donald D. Geddes...Minneapolis, Minn.

"Fixed Bridges Cast in One Piece"
Walter C. Shull.....Kansas City, Mo.

"Cast Gold Crowns with Porcelain Face"
W. L. Hough.....Laconia, N. H.

"Ceramics Simplified"
Benjamin A. Lincoln..Philadelphia, Pa.

"Partial Denture Attachments"
Henry E. Germann.....Cincinnati, Ohio

Oral Surgery, Radiology and Anesthesia
(Upper Tower Room)

"Exodontia, Removal of Impacted Teeth and Mouth Preparation"
J. A. Blue.....Birmingham, Ala.

"Exodontia and Minor Oral Surgery"
Ralph W. Edwards...Kansas City, Mo.

"A Technic for the Removal of Impacted Mandibular Third Molars"
J. P. Wahl.....New Orleans, La.

"Reconstructive Surgery of the Face and Jaws"
Clyde L. Straith.....Detroit, Mich.

"Cases from Boston City Hospital Oral Surgery Clinic"
George J. Fink.....Boston, Mass.
Stephen P. Mallett.....Boston, Mass.

"Various Types of Wiring of Fractures of the Mandible"
Philip E. Williams.....Durant, Okla.

"Some Anatomic Variations and Their Relation to Conduction Anesthesia"
William A. Cook.....Detroit, Mich.

"Surgical Preparation of the Mouth for Dental Prosthesis"
J. A. Doherty.....Boston, Mass.

"The Early Discovery of Incipient Mouth Tumors"
S. W. Leslie.....Toronto, Canada

"Technic for the Removal of the Impacted Mandibular Third Molar"
William S. Paine.....Ogden, Utah

"The Control of Postoperative Hemorrhage"
Carl T. Moyle.....Brantford, Canada

"Simplified Exodontia; Drill and Lever Technic"
M. Hillel Feldman.....New York City

"Some Salient Factors in Block Injection in Oral Surgery"
Sanford M. Moose..San Francisco, Calif.

"A Simplified Alveolectomy and Mouth Packing Technic for the General Practitioner"
H. W. Titus.....Eugene, Ore.

"Minor Oral Surgery and Subjects Pertinent to It"
W. H. Canavan.....Boston, Mass.

"Immobilization of Fractured Maxillae"
L. A. Stark.....Clarksburg, W. Va.

"Radiodontic Interpretation"
Edward S. Ball.....Cincinnati, Ohio

"Surgical Eradication of Oral Disease"
Harry M. McFarland..Kansas City, Mo.

"Surgical Preparation of the Mouth: Aluminum Casts Showing Treatment of Fractures of the Jaws"
Charles J. Smith.....Providence, R. I.

"Oral Surgery and Roentgenography"
G. W. Mathews.....Birmingham, Ala.

"Anesthesia—A Technic for Efficient Use of Procaine"
J. V. Birnberg.....St. Paul, Minn.

"A Practical Method for the Preparation of Anesthetic Solutions"
Paul C. Salisbury.....Chicago, Ill.

"A Modified Technic for the Surgical Removal of Teeth"
Menifee R. Howard.....Denver, Colo.

Orthodontia
(Lower Tower Room)

"Concept, Principles and Appliances in Orthodontia"
Andrew Francis Jackson.....
.....Philadelphia, Pa.

"Space Retainers and Functional Space Maintainers"
Max Kedesky.....Dubuque, Iowa

"Development of Malocclusion"
O. W. Brandhorst.....St. Louis, Mo.

"Preventive Orthodontia: Its Practical Application to General Practice"
Willett Study Club
C. S. Foster.....Cedar Rapids, Iowa
C. V. Lehman.....Cedar Rapids, Iowa
A. N. Humiston....Cedar Rapids, Iowa
C. F. Huber.....Cedar Rapids, Iowa
Ernest W. Anderson.Cedar Rapids, Iowa

"Orthodontic Treatment of Impacted Anterior Teeth"
Burton A. Hoffman.....Buffalo, N. Y.

"Orthodontia"
Leslie Parker Abbe.....Hartford, Conn.

"Use of the Edgewise Arch Mechanism"
Robert H. W. Strang.....
.....Bridgeport, Conn.

"Bone Development"
L. B. Gilling.....Green Bay, Wis.

"Electric Plaster Model Trimmer"
Ernest N. Bach.....Toledo, Ohio

"Orthodontia Case Reports; Treatment Procedures"
Bruce A. Curran,.....Cleveland, Ohio

"Bending the Edgewise Arch, and New Ligature Wire-Former"
Guy B. Steadman.....St. Paul, Minn.

"The Edgewise Arch Mechanism"
Charles H. Tweed.....Phoenix, Ariz.

Oral Pathology and Therapeutics
(South Ball Room)

"The Surgical Treatment of Periodontoclasia"
Irving J. Sperber.....New York City

"Periodontal Lesions"
W. D. Gibbs.....Charlotte, N. C.

"Surgical Elimination of Periapical Disease"
Julius H. Levine.....Boston, Mass.

"The Practical Treatment of Pyorrhea"
Bernard D. Friedman.....Chicago, Ill.

"Results Obtained in the Treatment of Periodontal Lesions"
W. H. Scherer.....Houston, Texas

"Intervention in Suppurative Pericementitis"
C. A. Hitzelberger.....Utica, N. Y.

"The Detection and Relief of Traumatic Occlusion"
Robert L. Dement.....Atlanta, Ga.

"Value of Study of Models and Bites in Traumatic Occlusion in Restoring Normal Function"
W. F. Clayton.....High Point, N. C.

"Root Canal Technic"
George Cunningham Sharp.....
.....Pasadena, Calif.

"Instrument Control in Root Canal Work"
Fred R. Adams.....New York City

"Electromedication and Its Use in Dentistry"
L. Gerald Smith.....Toronto, Canada

"A Simple and Effective Root Canal Technic, with Cases of Reimplantation and Fractured Roots"
George M. Shields.....Miami, Fla.

"The Mechanics and Therapy Involved in the Treatment of Pulpless Teeth"
Bernard Berg.....Boston, Mass.

"Practical Root Surgery"
Ralph F. Sommer.....Ann Arbor, Mich.
M. D. MacKoy.....Ann Arbor, Mich.
Samuel J. Levine.....Ann Arbor, Mich.
J. Raymond Dunwell..Ann Arbor, Mich.
William F. Bender....Ann Arbor, Mich.

"Root Canal Technic"
Ewing P. Brady.....St. Louis, Mo.

Biologic Sciences and Research
(West Ballroom)

"Crystal Formation in Enamel"
Paul C. Kitchin.....Columbus, Ohio

"Factors in Bone Healing Following Surgery of the Maxillary Bones"
Warren R. Schram.....St. Paul, Minn.

"Experimental Studies of Tooth Development"
Isaac Schour.....Chicago, Ill.

"Photomicrographs of Mouth Infections; Technic and Interpretation"
E. G. Van Valey.....New York City

"New Disclosures in Oral Pathology"
Don J. Aubertine..San Francisco, Calif.

"Biopsy Findings in Mouth Lesions"
W. M. Reppeto.....Dallas, Texas

"Preventive Dental Medicine"
M. Francis Wielage.....Miami, Fla.

"Epithelium in Periapical Granulomas"
Julio Fozzio Calmet.....
.....Montevideo, Uruguay

"Manikin Demonstration of Method of Securing Fresh Human Tissues for Histopathologic Study of Periodontal Disease"
James L. Zemsky.....New York City

"The Movement of a Tooth in Its Socket"
O. H. Stuteville.....Evanston, Ill.

SATURDAY MORNING, AUGUST 12

Operative Dentistry, Mouth Hygiene and Prevention
(North Ballroom)

"Preparation and Foil Manipulation—Woodbury Technic"
Harry A. True.....San Francisco, Calif.

"Compressing of Amalgam Fillings, Avoiding Contraction and Expansion"
Harry C. Althaffer....Kansas City, Mo.

"Operative Procedure in the Deciduous Molars"
Kenneth A. Easlick...Ann Arbor, Mich.

"Wax Patterns Direct"
O. B. Coomer.....Louisville, Ky.

"Gold Foil Manipulation"
Leroy L. Hartman.....New York City

"Clinical Operative and Roentgen-Ray Considerations in Children's Dentistry"
J. C. Brauer.....Lincoln, Nebr.

"New Developments in Hygroscopic Expansion of Casting Investments"
Carl H. Scheu.....Lakewood, Ohio

"Restoring Functionally Perfect Anatomic Form and Finish in Approximo-Occlusal Amalgam Fillings"
William E. Harper.....Chicago, Ill.

"Reconstruction of the Occlusion in Mutilated Natural Dentures Dealing with Lost Vertical Dimensions"
G. E. Cleophas.....Beloit, Wis.

"Gold Inlays in Deciduous Teeth"
F. S. Tittle.....Oak Park, Ill.

"Simplified Cavities and Uses of Gold Foil"
Prime Gold Foil and Research Club of Omaha, Nebr.
J. M. Prime, General Supervisor.....Omaha, Nebr.
D. E. Conley.....Omaha, Nebr.
Gladstone Derby.....Omaha, Nebr.
William E. Brennan.....Omaha, Nebr.
Lloyd C. Blackman.....Elgin, Ill.

"Cavity Preparation for Amalgam Fillings"
Warren Willman.....Chicago, Ill.

"The Effect of Certain Variables on a Gold Inlay Technic"
Robert K. Brown....Ann Arbor, Mich.
A. J. Hall.....Ann Arbor, Mich.
R. S. Moyer.....Ann Arbor, Mich.

"Manipulation of Gold Foil"
Seattle Dental Study Club.
W. I. Ferrier.....Seattle, Wash.
E. M. Jones.....Burlington, Wash.
C. T. Fleetwood.....Seattle, Wash.
A. W. Jeffery.....Seatlle, Wash.

"Prosthetic Appliances for Children"
Rolf J. Ullestad.....Chicago, Ill.

"Prosthetic Replacement During the Childhood Period"
H. C. Hutchinson.....Chicago, Ill.

"The Porcelain Inlay Restoring the Anterior Third of the Buccal Wall of Upper Bicuspids"
R. E. Price.....Wilmington, Del.

"A Handy Way of Manipulating Inlay Wax"
Charles N. Mowry.....Freemont, Ohio

"Restoration of Fractured Anterior Teeth in Children"
Detroit Clinic Club.
Walter C. McBride, Director.....Detroit, Mich.
C. W. Wilson.....Detroit, Mich.

"Dentistry for Children"
H. B. Shafer.....Anna, Ill.

"Detecting and Treating Proximal Caries in Deciduous Molars"
Chester J. Schultz..East Cleveland, Ohio

"Laboratory Procedure in Gold Inlay Construction"
D. H. Snyder.....Chicago, Ill.
W. A. Hocker.....Chicago, Ill.

"Dental Prevention and Care"
Kent K. Cross.....Denver, Colo.

"Amalgam Restorations"
Alfred Olsen.....Minneapolis, Minn.

"Synthetic Porcelain"
H. R. Seal.....Chicago, Ill.

"Casting of Gold Inlays"
Herbert E. Weis.....Chicago, Ill.

"Children's Dentistry"
L. F. Tinthoff.....Chicago, Ill.

"Quick, Consistent Method of Casting to Dimensions"
Earl L. Rice.....Minneapolis, Minn.

"Gold Foil Fillings"
Arthur F. Bruening....Niles Center, Ill.

"Cutting Planes on the Teeth with an Extension Handpiece"
Samuel M. Robbins.....Cleveland, Ohio

"Wax Patterns. Direct and Semidirect"
Clarence H. Burr.....Chicago, Ill.

"Gold Foil for the Anterior Teeth"
Waldo O. Urban.....Chicago, Ill.

"Amalgam Fillings"
Ray M. Dix.....Chicago, Ill.

Full Denture Prosthesis

(North Lounge Room)

"Producing Natural Effects and Appearance in Artificial Teeth by Grinding and Staining"
William O. Hulick.....Cincinnati, Ohio

"Immediate Denture Service Using Treatment Plates"
L. L. Sheffield.....Toledo, Ohio

"Technic for Upper and Lower Impressions"
J. M. Donohoe.....Superior, Wis.

"Determining Centric Occlusion Without Reference to Masticatory Effort"
Robert R. Gillis.....Hammond, Ind.

"Technic for Full Denture Impressions"
W. J. Hogan.....Chicago, Ill.

"Correction of Malocclusion in Artificial Dentures"
V. S. Keller.....Chicago, Ill.

"Selecting Teeth for the Edentulous Patient"
E. L. Richey.....Chicago, Ill.

"Factors in Full Denture Work"
H. K. Willits.....Reading, Pa.

"Positive Pressure Impressions Technic"
Donald F. Cole.....Oak Park, Ill.

"Roofless Dentures, Showing Impression Technic"
A. P. Craig.....Gary, Ind.

"Recording and Reproducing Functional Relationships of Full Dentures"
Carl O. Boucher.....Columbus, Ohio

"Positional Spot Grinding on Plain Line Articulators for Balanced Occlusion"
Lucien G. Coble.....Greensboro, N. C.

"Immediate Dentures"
Harry E. Denen.....Chicago, Ill.

"Rebasing Full Dentures Retaining Centric Occlusion"
Virgil P. Perisho.....Streator, Ill.

"Making Artificial Dentures"
George H. Henderson.....Chicago, Ill.

"Newer Lights on Establishing the Vertical Relation of the Upper and Lower Jaws"
M. E. Niswonger.....Dayton, Ohio

"Neil Impression Technic in Full Dentures"
James B. Cullen.....St. Cloud, Minn.

"Modeling Compound for Obtaining Retention of Full Lower Dentures and for Rebasing"
J. F. Cart.....Peoria, Ill.

Partial Dentures, Crown and Bridge and Ceramics

(South Lounge Room)

"Movable Fixed Bridgework and Removable Bridgework"
Chester A. Good.....Harrisburg, Pa.

"Gold Inlay, Three-Quarters Crown and Full Cast Crown Restoration"
Leo S. Seidner.....Chicago, Ill.

"Porcelain Restorations"
W. Spaulding Both.....New York City

"Dental Ceramics"
A. E. Schneider.....Chicago, Ill.

"Partial Denture Clasp Construction and its Variations"
George L. Carey.....Park Ridge, Ill.

"Quick, Accurate Method for Making Wax Impressions for Three-Quarter Crowns, Direct or Indirect"
D. R. Biddle.....Albuquerque, N. M.

"Practical Application of Porcelain"
T. E. Kallenbach.....St. Louis, Mo.

"Fixed Bridge Abutment Pieces"
Robert E. MacBoyle.....Chicago, Ill.

"Porcelain Jacket Crowns Using a Gold Shoulder"
C. C. Bastian.....New York City

"Cavity Preparation for Pinlays Used as Bridge Abutments"
W. T. Newton.....Houston, Texas

"Porcelain Jacket Crown Technic Using Low Fusing Porcelain"
Herbert S. Ray.....Chicago, Ill.

"Anatomic Reproduction, Full Crown, Cast or Swaged"
T. S. Malson.....Cleveland, Ohio

"Porcelain Occusal Restorations for Shell Crowns or Inlays"
P. O. Giles.....Chicago, Ill.

"Restorations and Bridge Abutments"
Walter E. Jones....Minneapolis, Minn.

"Removable Bridgework, One Piece Casting, Where No Preparation of Abutment Is Necessary"
Charles P. Grosby.....St. Louis, Mo.

"Bridge Restorations"
W. J. Robinson.....Philadelphia, Pa.

"Anterior and Posterior Abutment Pieces for Fixed Bridgework"
Frank D. Lindner.....Chicago, Ill.

"Porcelain Jacket Crowns and Inlays"
Sophia N. Bolotny.....Chicago, Ill.

Oral Surgery, Radiology and Anesthesia

(Upper Tower Room)

"Reconstructive Surgery of the Face and Jaws"
Floyd L. Straith.....Detroit, Mich.

"The Use of Flaps in Surgical Extractions"
J. C. Martin.....Rockford, Ill.

"Simplified Method of Wiring Mandibular Fractures"
Elvin P. Voyles.....Memphis, Tenn.

"Oral Surgery and Pathology"
Paul J. Aufderheide....Cleveland, Ohio

"Modern Local Anesthesia"
Harold F. Dailey.....South Bend, Ind.

"The Use of an Obturator Following the Partsch Operation for Cyst"
Ellis Bovik.....Chicago, Ill.

"Exodontia Technic"
A. Malcolm Smith.....Tampa, Fla.

"Surgical Treatment of Oral Tissues for Reception of Dentures"
Emil L. Aison.....Chicago, Ill.

"Osteomyelitis"
R. J. Yechout.....Omaha, Neb.

"Treatment of Alveolar Tissues in the Extraction of Teeth and Residual Roots"
Homer Peer.....Urbana, Ill.

"The Removal of Teeth by Open Dissection"
Seth W. Shields.....Indianapolis, Ind.
F. G. Heimlich.....Indianapolis, Ind.

"Apicoectomy"
W. E. Redlich.....Chicago, Ill.

Treatment of Antral Disease of Dental Origin"
G. W. Christiansen.....Detroit, Mich.

"Case Report—Adamantinoma of Mandible"
J. C. Grayson Fitz-Hugh.....
.....McKeesport, Pa.

"Late Treatment of Fractures of the Mandible and Maxillae with Malposed Fragments"
Kenneth W. Penhale.....Chicago, Ill.

"Block Anesthesia"
Edward H. Reiter.....Cleveland, Ohio

"Some Interesting Cases of Minor Oral Surgery"
W. A. Crich.....Toronto, Canada

"Lower Third Molar Removal—Elevator Technic"
D. M. Hodgman.....Chicago, Ill.

"Oral Surgery—Including Case Histories"
C. M. Logsdon.....Hines, Ill.

"Exodontia—Elevator Technic"
J. E. Harris.....Chicago, Ill.

"Proper Technic of Flap Operation Used in Pathologic Conditions of the Mouth"
E. Benton Conway.....Columbus, Ohio

"Treatment of Fractures in Edentulous Cases"
Leslie M. Fitzerald.....Dubuque, Iowa

Orthodontia

(Lower Tower Room)

"The Proper Time for Orthodontic Treatment of Deciduous and Mixed Dentitions"
Richard A. Smith.....Evanston, Ill.

"Demonstration of Orthodontia Model Holder"
Burne O. Sippy.....Chicago, Ill.

"Malocclusion and Tooth Deflections Caused by Supernumerary Teeth"
Frederick T. Barish.....Evanston, Ill.

"Orthodontic Appliances for Individual Cases"
A. C. Gifford.....Oshkosh, Wis.

"Treated Deciduous Teeth"
Charles R. Baker.....Evanston, Ill.

"Orthodontia"
L. B. Higley.....Iowa City, Iowa

"Keystone Interchangeable Orthodontic Lock"
Landis H. Wirt.....South Bend, Ind.

"Extra-Oral Roentgen-Rays in Orthodontia"
Asa J. LaGrow.....Oak Park, Ill.

"Differential Diagnosis and Brief Outline for Treatment of Certain Types of Dentofacial Deformities"
J. E. Rose.....Iowa City, Iowa

"Orthodontic Treatment for Adult Patients"
Frederick E. Haberle.....Chicago, Ill.

"Space Maintainers and Habit Correcting Devices"
Barney C. Cooksey.....Chicago, Ill.

"Lourie High Labial Arch"
Ralph G. Bengston.....Chicago, Ill.

"Hook Attachments"
Rodney H. Marks.....Chicago, Ill.

"A New Orthodontic Band"
J. W. Ford.....Chicago, Ill.

"Low Cost Retainers"
W. B. Downs.....Aurora, Ill.

"Studies in Orthodontia"
Allan G. Brodie.....Chicago, Ill.

Oral Pathology and Therapeutics

(South Ballroom)

"Surgical Treatment of Pyorrhea"
John T. Maguire.....Wilmington, Del.

"Surgical Treatment of Pyorrhea"
Harold G. Ray.....Chicago, Ill.
Jules LeGrand.....Chicago, Ill.

"Periodontia: Its Treatment and Management"
G. H. Aiken.....Chicago, Ill.

"The Individual Missing Tooth; Its Maleffects on the Masticating Apparatus"
Isador Hirschfeld.....New York City

"Results of Pyorrhea Resection"
A. J. Skupa.....Chicago, Ill.

"Root Canal Technic"
D. I. Brown.....Chicago, Ill.

"Opening and Filling Difficult Canals"
Harry B. Johnston.....Atlanta, Ga.

"Sterilizing Putrescent Canals and Inserting Stable Canal Fillings"
Lucien H. Arnold.....Chicago, Ill.

"Increasing the Resistance of Periodontal Tissue"
Clarke E. Chamberlain.....Peoria, Ill.

"Simple Technic for Filling Root Canals"
Eugene Maginnis.....Chicago, Ill.

"A Satisfactory Root Canal Therapy"
John H. Hospers.....Chicago, Ill.

"The Clinical Application of the Principles Which Govern Pulp Canal Therapy"
Robert G. Kesel.....Chicago, Ill.
Robert M. Stephan.....Chicago, Ill.
Edgar H. Kramp.....Chicago, Ill.
Joseph L. Bernier.....Chicago, Ill.
Edward C. Wach.....Chicago, Ill.

"Surgical Eradication of Periodontoclasia Complex"
P. A. Howell.....Beloit, Wis.

Biologic Sciences and Research
(West Ballroom)

"Anatomy of the Root Canals"
A. H. Mueller.....Chicago, Ill.

"Pathology and Treatment of Fungus Oral Infection"
T. A. Hardgrove....Fond du Lac, Wis.

"The Biologic Phases of Full Denture Retention"
E. C. Pendleton.....Chicago, Ill.

"Studies in Mucin"
Anna C. Nichols.....Chicago, Ill.

"Bloodless Surgery for Elimination of Pyorrhea Pockets"
Joseph Anthony Hopkins..Rockford, Ill.

"Preparation of Sections Through Large Human Jaw Specimens"
Rudolf Kronfeld.....Chicago, Ill.

"Diffuse Fibroma of the Gums"
H. J. Buchner.....Oak Park, Ill.

"The Floor of the Maxillary Sinus and Its Dental, Oral and Nasal Relations"
Wallace F. Mustain..Warrenton, N. C.

"Anatomy for the Dentist"
John F. Svoboda.....Chicago, Ill.

"Normal Anatomy of Oral and Pharyngeal Region with Reference to Dentistry"
S. P. Miller.....Minneapolis, Minn.

General Clinics
(Grand Ballroom)

"Gold Restorations Displayed on Models"
H. M. Forister.....Cheyenne, Wyo.

"Crown and Bridge"
W. J. Bray.....Chicago, Ill.

"A Gold Crown That Really Fits"
Dale H. Hoge.....Joliet, Ill.

"The Various Steps in Opening the Bite and Building to Balance, with Fixed Reconstruction, by Aid of the Monson Mandibulomaxillary Instrument"
G. A. Lawson.....Duluth, Minn.

"Methods and Effects of Heat-Treatment of Golds"
K. W. Ray.....Chicago, Ill.

"The Direct Indirect Method of Expansion Technic in Dental Castings"
L. M. Daniels.....Southern Pines, N. C.

"Porcelain Technic"
George J. Anderson....Portland, Maine

"Dimensional Casting Technic by the Use of a Simplified Eliminator and Expander"
P. L. Knutzen.....Dallas, Texas

"Fixed Bridgework"
William Kopperud.....Chicago, Ill.

"Precision Castings Showing Comparative Results with Various Investment Compounds and Technics"
S. Wollenberger.....Chicago, Ill.

"A Progressive Group Clinic Demonstrating the Bridge Casting Technic"
F. S. Meyer.....Minneapolis, Minn.
E. J. Sundby.....Duluth, Minn.
J. B. Towey.....Minneapolis, Minn.
W. J. von Bank.....New Ulm, Minn.
R. S. Maybury.....Minneapolis, Minn.
A. R. Owre.....Minneapolis, Minn.
R. N. Albinson.....Minneapolis, Minn.
T. J. Mee.....Minneapolis, Minn.
Rolland R. Jones....Minneapolis, Minn.
C. H. Turnquist....Minneapolis, Minn.
C. A. Swanson.....Minneapolis, Minn.

"Time Saver in Waxing Up Three-Quarter Crowns"
M. C. Mohn.....Mobridge, S. D.

"Gold Inlays and Bridgework"
John Kuratli.....Portland, Ore.

"The Art of Staining and Glazing Porcelain Teeth"
W. L. Warburton..Salt Lake City, Utah
Clifford Rudine....Salt Lake City, Utah
J. H. Davis.....Salt Lake City, Utah
H. R. Nordberg....Salt Lake City, Utah
Gustave W. Teudt..Salt Lake City, Utah

"A Radical Short Cut in Cast Crown Construction"
C. L. Lynn.....Redwood Falls, Minn.

"A New and Simple Technic for Fixed Bridgework"
Lester D. Kaplin.....Chicago, Ill.

"Inlay and Partial Denture Casting"
Southwest District, Iowa Casting Clinic
D. W. Ireland.....Corning, Iowa
W. H. Sidwell.....Villisca, Iowa
E. R. Stealy.....Shenandoah, Iowa
C. W. Steward.....Iowa City, Iowa
H. T. Dearborn.....Red Oak, Iowa
L. W. Lewis.....Shenandoah, Iowa
F. M. Kelsay.....Villisca, Iowa
R. D. Morris.....Red Oak, Iowa
J. H. Bang.....Council Bluffs, Iowa
Max Everett Brown....Red Oak, Iowa
C. H. Stewart.....Farragut, Iowa

"Jig Saw Puzzles of Prosthetic Dentistry"
F. E. Morton.....Hurley, N. M.

"Dimensional Castings"
Max Kornfeld.....St. Louis, Mo.

"Precision Fixed Bridgework in Two Sittings, Disregarding Parallelism of Abutments"
F. Van Minden.....Chicago, Ill.
Harry Spiro.....Chicago, Ill.

"Gold Restorations"
Ralph F. Jarrett.....Charlotte, N. C.

"A Scientifically Correct Precision Inlay Technic"
David W. Phillips.....Chicago, Ill.

"Inlay and Crown Castings Using Cristobalite"
R. A. Greenawalt..Cedar Rapids, Iowa

"The Correction of Congenital Cleft Palates by Appliances"
John J. FitzGibbons....Holyoke, Mass.

"Fixed Bridge Construction"
Indianapolis Study Club
John F. Johnston
Paul R. Oldham
James W. Huckleberry
Gale R. Oldham
Robert G. Botkin
Nathan O. Hantman
J. Eldon Spahr
Paul Forest
Delmar D. Curry
Robert K. George

"Casting Technic Showing Simplicity with Accuracy in Constructing Inlays, Three-Quarter Crowns, Bridge Abutments, etc."
W. B. Dorman.....Nashville, Ark.

"Cast Pinlay Abutments and Individual Restorations"
B. F. Thielan.....Paris, Texas

Temple University Group Clinics

"The Development and Treatment of Children's Teeth; Models and Photographs of Harelips"
Theodore D. Casto....Philadelphia, Pa.

"Dentistry for Children"
Gustav C. Tassman....Philadelphia, Pa.

"Models of Cleft Palate Cases upon Which Orthodontia or Prosthodontia Have Been Practiced"
George W. Thompson..Philadelphia, Pa.

"Dentistry for Children"
B. Elizabeth Beatty....Philadelphia, Pa.

"Denture Repair"
Albert E. Bonnell.....Muskogee, Okla.

"Oil Impression Paste; Impressions for Full and Partial Dentures"
E. Byron Kelly.....Chicago, Ill.
L. L. Burroughs.....Chicago, Ill.

"Time Saving Appliances and Suggestions for the General Practitioner"
John H. Yearick.....Philadelphia, Pa.

"The Assembly and Operation of a Simple Efficient Copper Plating Unit"
W. L. Smith.....Cleveland, Ohio

Marquette University Group Clinics

"Fundamentals of Operative Dentistry"
G. W. Wilson
W. H. J. Benson
J. N. Schlick
E. E. Kraus
L. O. Pilling

"Technic for Porcelain Jacket Crowns and Inlays"
H. M. Uebele
A. H. Bassman

"An Analysis of Attachments for Fixed Bridgework"
O. G. Krause
G. B. Fee
E. P. Baus

"Technical Procedures in Full and Partial Denture Prosthesis"
O. M. Dressen
M. G. Cavanaugh
J. W. Quasney

"Oral Surgery, Pathology and Histology Departments"
F. C. Margoles
William Hopkinson
J. P. Justin
J. M. Gulas

"Diagnosis and Removal of Dental Foci"
W. R. Plater
J. R. Plater

"Dental Materia Medica and Prescription Writing"
Frederick C. Mayer

"Procain—A Practice Builder"
I. J. Silverman.....Syracuse, N. Y.

"The Maxillary Sinus"
Starr L. Beckwith-Ewell.....
.....Hartford, Conn.

"A Novel Hypodermic Method for Maintenance of Drug Integrity and Convenience"
C. F. B. Stowell.....Chicago, Ill.

"Local Anesthesia as Used in General Practice"
Claude H. Ritsch....Beaver Dam, Wis.

"Facial and Deep Cervical Phlegmons of Dental Origin, Also Various Inflammatory Conditions Frequently Mistaken as of Dental Origin"
Mathew Podoline.....Buffalo, N. Y.

"Fractures of Maxilla and Mandible—Special Appliances"
John L. Preston...Wichita Falls, Texas

"Stereoscopic Roentgenography in Oral Lesions"
R. W. Lee.....Iowa City, Iowa

"Roentgen-Ray Interpretation of Edentulous Areas"
A. B. Dusinbere..Clifton Springs, N. Y.

"Exodontia and Roentgen Rays"
Robert J. Wells.....Chicago, Ill.

"Oral Roentgenography; an Exhibit of Cases and a Discussion of Their Interpretation"
Franklin W. McCormack.....
.....Los Angeles, Calif.

"Extra-Oral Roentgenography"
Fred Morrison.....Kokomo, Ind.

"Stereoscopic Roentgen-Rays"
F. J. Martin.....Medford, Wis.

"The Value of Roentgen-Rays in Exodontia"
Guy L. Haman.....Reading, Pa.

"Intra-Oral Stereoscopic Roentgenograms"
E. S. Hodgson.....East St. Louis, Ill.

"Dental Roentgenographic Interpretations"
Louie T. Austin.....Rochester, Minn.

"The Value of the Roentgen-Rays in Diagnosing Surgical Diseases of the Jaws"
C. J. Hudson.....Cincinnati, Ohio
D. V. Dalton.....Cincinnati, Ohio

"Controlled Ultraviolet Ray Therapy"
A. T. Rasmussen.....LaCrosse, Wis.

"Scientific Method of the Removal of Teeth Surrounded by Periodontoclasia"
Rush P. Abbott.....West Point, Miss.

"Orthodontia in Everyday Practice"
Leonard H. Kohn.....Brooklyn, N. Y.

"Toothbrush Technic"
W. J. Charters.....Des Moines, Iowa

"Periodontia and Vincent's Infection Treatment with a Plastic Composition or Pack, Reducing Pyorrheal Pockets and Infections by Absorption"
Samuel H. Goodfriend.....Chicago, Ill.

"Osseosector for Impacted Teeth and Fractured Roots"
J. D. Towner.....Memphis, Tenn.
Sidney S. Friedman.....Memphis, Tenn.

"Macroscopic Study of Root Surfaces Relative to Apoxesis"
C. J. Caraballo.....Tampa, Fla.

"Liberation of Locked Bite with Traumatic Occulusion"
S. K. Avery.....Hammond, Ind.
B. W. Avery.....Hammond, Ind.

"Dentistry for Children"
University of Illinois Children's Clinic
Elsie Gerlach, Director
Beulah G. Nelson
J. S. Vission
E. R. Potocki
R. H. Skudstad
M. Levin

"Clinical Service for Children
J. L. Ubl.....Chicago, Ill.

"Procedure in Children's Clinic Dental Practice"
Harry Strusser.....New York City

"Promotion of Children's Dentistry in a General Practice"
Elmer F. Schroeder.....Toledo, Ohio

"Supernumerary Dentition Followed by Partial Eruption of Permanent Teeth"
Peter Appel, Jr.....Cheyenne, Wyo.

"Infrared Ray"
R. Bullock Jones.....Willimantic, Conn.

"Wax Face Masks and Technic for Same in Natural Colors"
Reginald H. Johnson.....Chicago, Ill.

"Preventive Dentistry's Advantages in Regular Visits to the Dentists"
M. M. Lumbattis.....Mt. Vernon, Ill.

"Office Preparations, Drugs and Prescriptions for the Dentist"
Arthur F. Palmer.....Lynn, Mass.

"Menace of the Impacted Third Molar"
R. M. Morange.....Chicago, Ill.

"Preserving Facial Contour and Esthetics"
Kermit F. Knudtzon.....Chicago, Ill.

"Display of Moulages Showing Diseased Conditions of the Mouth"
C. A. Schulz.....Glenview, Ill.

"Plaster Impression for Facial Cases"
D. N. Lewis.....Lake Forest, Ill.

"Wax Models as Records of Face Forms"
Will H. McCarty.....Chicago, Ill.

"Face Masks and Models"
L. H. Wolfe.....Quincy, Ill.

"The Making of Facial and Body Casts"
Morris Gruenebaum....Cincinnati, Ohio

"Educational Models of Pathologic Lesions"
Hoyt D. Simpson.....Atlanta, Ga.

"Wax and Plaster Masks and Models Showing Disease and Anomalies"
W. Claude Adams.....Portland, Ore.

"Clay Models"
Richard H. Snyder.....Chicago, Ill.

"Fundamentals of Prophylaxis"
A. H. Sohm.....Quincy, Ill.

"Full Mouth Reconstruction to a Balanced Occlusion"
Frank H. Voorhees.....Chicago, Ill.

"Exodontia"
Henry J. Droba.....Chicago, Ill.

"Aniscoria of Dental Origin"
Piperno Arrigo.....Rome, Italy

"Cysts of the Jaws"
Eli Olech.....Chicago, Ill.

"Inlay Clinic with Special Stress on Carving and Finishing Wax Pattern"
Charles M. Buckman.....Chicago, Ill.

"Full Denture Impressions"
Springfield (Ill.) Dental Study Club Group.
R. R. Blanchard, Director

"The Necessity of Early Treatment in Orthodontia"
H. B. Singler

"Inlays with Special Reference to Mesioclusodistal Inlays"
Anton Gerster

"Inlays"
LeRoy R. Stearman

"Inlays"
J. W. Green

"Full Denture Impressions"
J. L. Lambert

"Home Made Bite-Wings"
L. L. Hopkins

"Essentials of a Good Amalgam Restoration"
B. B. Beatty

"Uses of Crowns"
John J. Donelan

"Gold and Tin Foil in Combination in Mouth of Adolescents"
E. F. Hazell

"Dental Floss and Toothpicks"
E. C. Jordan

"Elevator Technic; Removal of Lower Bicuspids and Molars"
G. H. O'Hara

"Surgical Preparation of the Mouth for Dentures"
J. T. Yates

"Incidents in Dental Practice"
James C. Donelan

"Pyorrhea Technic"
Hugh T. McDermott

"Preparation and Use of Vaccines Prepared from Each Individual Case"
Robert T. Curran

"Modified Lingual Bar"
Clifford G. Maxwell

"Oil Impression Technic with Closed Bite"
W. E. Wilson

"Roentgen-Ray Occlusal and Bite-Wing Films"
Alois D. Newberger.....Chicago, Ill.

"Technic of Difficult Extractions"
George Schneider.....LaSalle, Ill.

"Anatomy for the Dentist"
William N. Holmes.....Chicago, Ill.

"Overcoming Difficulties in Extraction"
Ben J. Svoboda.....Chicago, Ill.

"Methodical Diagnosis in Orthodontic Procedure"
P. J. Murphey.....Dallas, Texas

"Local Anesthesia and Minor Oral Surgery"
James H. Maycock.East Gardner, Mass.

"Simple Method of Producing Neat and Attractive Study Models"
R. M. Gorder.....Longmont, Colo.

"Esthetics as Shown in Plastic Photography"
John F. Dwight.....Des Moines, Iowa

"Roofless Dentures"
William Weingart.....Chicago, Ill.

"Elevator Technic in Tooth Extraction"
J. F. Pocock.....Lancaster, Ohio

Special Hospital Clinics

Tuesday, 10:00 a. m.

Oral Surgery
Louis Schultz .....Chicago, Ill.
(Educational and Research Hospital)

Tuesday, 2:00 p. m.

Fracture Clinic; Oral Surgery Clinic
William H. G. Logan.....Chicago, Ill.
(Cook County Hospital)

Wednesday, 10:00 a. m.

Oral and Plastic Surgery
Frederick B. Moorehead.....Chicago, Ill.
(Presbyterian Hospital)

Thursday, 10:00 a. m.

Oral Surgery
Joseph E. Schaefer.....Chicago, Ill.
(Cook County Hospital)

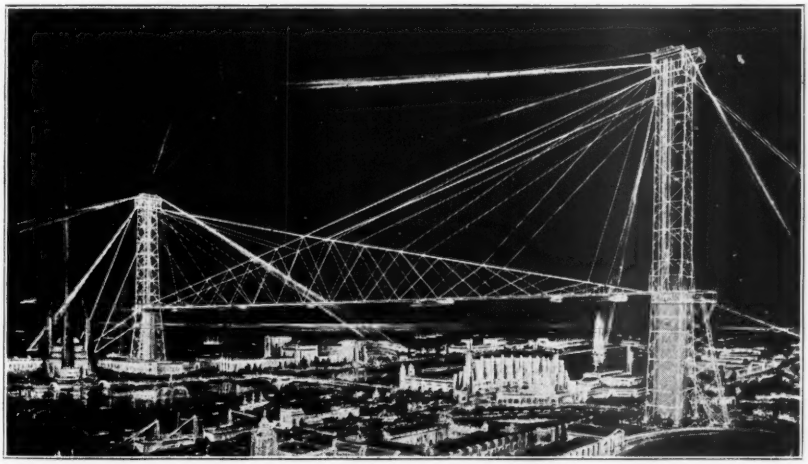
Friday, 10:00 a. m.

Oral Surgery Diagnosis
Herbert A. Potts .....Chicago, Ill.
(St. Luke's Hospital)

SPECIAL CLINICS

(Foyer Grand Ballroom)

A group of clinics will be presented by the American Dental Hygienists Association and a number of state hygienists associations.



"Sky Ride," A Century of Progress Exposition.

THE CHICAGO SESSION

THE ORIGIN AND PURPOSE OF THE CHICAGO CENTENNIAL DENTAL CONGRESS

In order that everyone may have a proper conception of the origin of the Chicago Centennial Dental Congress, the following historical facts are recorded. Almost four years ago, when preliminary plans for A Century of Progress Exposition were being formulated, the Chicago Dental Society received a request from Mr. Rufus C. Dawes, president of the Exposition, to arrange a meeting of dentists in Chicago during the period of the Exposition. It was suggested by Mr. Dawes that this meeting be international in scope and portray the progress in dentistry during the past one hundred years. This theme coincides with that of the Exposition, the purpose of which is to portray the advances made in all branches of human endeavor during the period of Chicago's existence, which will be exactly one hundred years on Aug. 5, 1933.

The Chicago Dental Society, in order to meet this request, decided to postpone its 1933 Annual Meeting, originally scheduled for January, and stage a meeting during the period of the Exposition which would eclipse, from every angle, any dental meeting held up to that time. To carry out this broad purpose, the Board of Directors of the Chicago Dental Society appointed a Commission which ultimately developed the Chicago Centennial Dental Congress. The Congress now functions as a separate and independent unit.

At the Memphis meeting of the American Dental Association, held in October, 1931, the officers of the Congress consisting of Arthur D. Black, president; Hugo G. Fisher, vice-president; Stanley D. Tylman, secretary, and Christian Davidson, treasurer, presented to the Association an invitation to hold its meeting in Chicago in conjunction with the Congress. The invitation was tentatively accepted and a committee was appointed to work out the details with the officials of the Congress. Several meetings were held and a mutually satisfactory agreement was reached. This special committee of the American Dental Association reported to the Association in Buffalo, when final action was taken.

The announcement that the Diamond Jubilee of the American Dental Association would be held in conjunction with the Congress was enthusiastically received throughout the country. It was recognized immediately that with A Century of Progress Exposition as a background the stage was set for the largest and most important dental meeting of all time.

Since that date, literally hundreds of committeemen have worked at their appointed tasks with but one ultimate purpose in view—to present to the profession the greatest dental gathering of history. It is believed that that purpose has been accomplished, not only so far as the program and entertainment is concerned but, also, in the development and presentation of the dental exhibit in the Hall of Science on the Fair grounds.

This display is the most ambitious public educational effort ever attempted by the organized profession. Three years of time, thought and energy and the expenditure of almost $50,000 were required to develop dentistry's display. Every dentist is urged to remind his patients to see this exhibit when they come to the Exposition.

The Chicago Centennial Dental Congress with the cooperation of the American Dental Association and the Chicago Dental Society has prepared a meeting which will establish a new and higher standard for all dental meetings in the years to come.

PRESIDENTS' BALL AND BANQUET

The Presidents' Ball and Banquet of the Chicago Centennial Dental Congress and the American Dental Association under the auspices of the Chicago Dental Society will be held Friday evening, August 11, in the Grand Ballroom of the Stevens Hotel.

GALA NIGHT

The week the Congress is in session has been officially designated as "Dental Week" at A Century of Progress, and Thursday, August 10, has likewise been officially designated as "Dental Day." For this reason the evening of that day has been chosen to celebrate Gala Night at the Exposition. U. S. Senator Henrik M. Shipstead will speak. There will be no counter attractions at the Stevens Hotel and all who attend the meeting are invited to be present at the Exposition for this event.

LADIES' ENTERTAINMENT

Wednesday, August 9, the Ladies' Luncheon will be held at the Edgewater Beach Hotel at 12:30 o'clock. Mrs. Rufus C. Dawes, wife of the president of A Century of Progress Exposition, will be the special guest on the occasion. Transportation from the Stevens Hotel will be provided, along the Gold Coast, through scenic Lincoln Park, and along the shores of Lake Michigan. An afternoon of bridge will follow. Those not desiring to play bridge can avail themselves of the comfortable chairs on the Beach Walk. All out of town dentists' wives are to be guests. Dentists should secure tickets when registering.

GOLF TOURNAMENT

The golf tournament of the Chicago Centennial Dental Congress in conjunction with the American Dental Golf Association under the auspices of the Sports and Pastimes Committee of the Chicago Dental Society will be held on Monday, August 7, at the Olympia Fields Country Club, Chicago.

RADIO BROADCAST

Through the courtesy of the principal radio broadcasting stations of Chicago and the cooperation of prominent members of the profession, a complete program of radio talks will be presented daily during the Congress. Cooperating stations are WGN, WMAQ, WBBM, WENR, WIBO, WLS, WCFL, KYW and WJJD.

PAST PRESIDENTS' LUNCHEON

The Past Presidents' Club of the American Dental Association will hold its annual luncheon at 12:30 p. m., Tuesday, August 8, 1933, in Room 505, the Stevens Hotel. Robert Todd Oliver will be the presiding officer and the annual address will be delivered by C. Victor Vignes. Every Past President is requested to be in attendance.

HOMER C. BROWN, *Secretary*

ANNOUNCEMENTS

AMERICAN ACADEMY OF PERIODONTOLOGY

The annual meeting of the American Academy of Periodontology will be held at the Stevens Hotel, August 3-5. The banquet will be held August 4, in the same hotel.

CLAYTON H. GRACEY, *Secretary*,
Fisher Bldg.,
Detroit, Mich.

THE AMERICAN ACADEMY OF RESTORATIVE DENTISTRY

The 1933 meeting of the American Academy of Restorative Dentistry will be held at the Stevens Hotel, August 5-6.

RALPH R. MORRISON, *Secretary*,
The LaSalle,
Washington, D. C.

AMERICAN ASSOCIATION OF DENTAL EDITORS

The annual meeting of the American Association of Dental Editors will be held August 5, a dinner following in the evening.

JOHN GURLEY, *Secretary*,
350 Post St.,
San Francisco, Calif.

AMERICAN COLLEGE OF DENTISTS

The convocation of the American College of Dentists for the year 1933 will be held at the Hotel Stevens, August 6. Degrees will be conferred, the regular order of procedure following. Members will please comply with the rules of the college pertaining to regalia.

ALBERT L. MIDGLEY, *Secretary*,
Union Trust Bldg.,
Providence, R. I.

AMERICAN DENTAL ASSISTANTS ASSOCIATION

The ninth annual meeting of the American Dental Assistants Association will be held

August 8-12, at the Stevens Hotel, with an informal banquet on the evening of August 8.

RUTH CLARK, *Secretary,*
Scofield Bldg.,
Minot, N. D.

AMERICAN DENTAL HYGIENISTS ASSOCIATION

The annual meeting of the American Dental Hygienists Association will be held at the Hotel Stevens, August 7-12. The annual banquet will be held August 8.

AGNES G. MORRIS, *Secretary,*
Bridgeport, Conn.

AMERICAN DENTAL TRAPSHOOTERS LEAGUE

The American Dental Trapshooters League will hold its annual shoot, August 6-7, at the Lincoln Park Traps, Chicago.

WILLIAM H. JORDAN, *Secretary,*
2004 Bryant Bldg.,
Kansas City, Mo.

THE AMERICAN FULL DENTURE SOCIETY

The fourth annual meeting of the American Full Denture Society will be held at the Congress Hotel, Chicago, August 6-7.

H. L. HARRIS, *Secretary.*

AMERICAN SOCIETY FOR THE PROMOTION OF DENTISTRY FOR CHILDREN

The American Society for the Promotion of Dentistry for Children will hold its seventh annual luncheon and business meeting, August 7, at the Stevens Hotel, Chicago.

CHARLES A. SWEET, *Secretary,*
204 Moss Ave.,
Oakland, Calif.

COMMITTEE FOR DENTAL HEALTH SURVEY

There will be a breakfast meeting for the Executive Council of the Committee for Dental Health Survey in Room 435 A, at 7:30 Tuesday morning, August 8. The entire Committee will meet at 8:30, in Room 435 A, Tuesday morning, August 8.

C. T. MESSNER.

AMERICAN SOCIETY OF ORAL SURGEONS AND EXODONTISTS

The fifteenth annual meeting of the American Society of Oral Surgeons and Exodontists will be held August 4-5 at the Stevens Hotel, with a banquet and dance August 4.

HARRY BEAR, *Secretary,*
Professional Bldg.,
Richmond, Va.

ASSOCIATION OF AMERICAN WOMEN DENTISTS

The annual meeting of the Association of American Women Dentists will be held August 7 at the Stevens Hotel, with a luncheon, the "Gillette Hayden Memorial," at the Sarah Hackette Home and the annual banquet in the evening.

E. PEARLE BISHOP, *Secretary,*
Republic Bldg.,
Denver, Colo.

ASSOCIATION OF MILITARY DENTAL SURGEONS OF THE UNITED STATES

The annual business meeting and banquet of the Association of Military Dental Surgeons of the United States will be held in the North Lounge of the Hotel Stevens, Tuesday evening, August 8.

THOMAS J. CASSIDY,
311 E. Chicago Ave.,
Chicago

INSTITUTE OF DENTISTRY

The annual convocation of the Institute of Dentistry will be held at the Hotel Stevens, August 6 at 3:00 p. m.

R. A. JENTZSCH, *Secretary,*
185 N. Wabash Ave.,
Chicago.

ANNUAL MOUTH HYGIENE LUNCHEON

The annual Mouth Hygiene Luncheon will be held in the Main Dining Room of the Stevens Hotel, August 9, speaker, W. A. Evans, health editor of the *Chicago Tribune.*

E. L. PETTIBONE, *Chairman,*
6503 Detroit Ave.,
Cleveland, Ohio.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS

The fifty-first annual meeting of the National Association of Dental Examiners will be held August 7, at the Stevens Hotel. All members of state boards are invited to participate.

GEORGE L. POWERS, *Secretary,*
Sterick Bldg.,
Memphis, Tenn.

NATIONAL SOCIETY OF DENTURE PROSTHETISTS

The annual meeting of the National Society of Denture Prosthetists will be held at the Stevens Hotel, beginning July 26, and continuing through August 5.

I. L. FURNAS, *Secretary.*

RESEARCH COMMISSION OF THE AMERICAN DENTAL ASSOCIATION

The Executive Council of the American Dental Association Research Commission will meet August 4 and 5, at 4:00 p. m., at the Stevens Hotel. The full Commission will meet on the following days: August 6, 7 and 9.

C. T. MESSNER, *Secretary,*
U.S.P.H.S.,
Washington, D. C.

STATE SOCIETY OFFICERS' CONFERENCE

The annual conference of State Society Officers and the Officers and Board of Trustees of the American Dental Association will be held Sunday, August 6, at 9:00 a. m. This meeting will continue throughout the day and evening.

AMERICAN DENTAL ASSOCIATION

H. B. PINNEY, *Secretary,*
212 E. Superior St.,
Chicago.

CHICAGO COLLEGE OF DENTAL SURGERY ALUMNI ASSOCIATION

The annual homecoming banquet of the Chicago College of Dental Surgery Alumni Association will be held on August 9 in the Grand Ballroom of the Stevens Hotel. This function will be in commemoration of the fiftieth anniversary of the founding of the Chicago College of Dental Surgery.

H. B. PINNEY, *Secretary,*
212 E. Superior St.,
Chicago.

UNIVERSITY OF ILLINOIS DENTAL ALUMNI

A testimonial banquet and ball will be held for the University of Illinois Dental Alumni at the Stevens Hotel, Room 560, Wednesday evening, August 9.

ERNEST MYER, *Secretary,*
180 N. Michigan Ave.,
Chicago.

NORTHWESTERN UNIVERSITY DENTAL SCHOOL ALUMNI ASSOCIATION

The class reunion banquet of the Northwestern University Dental School Alumni Association will be held August 9, in the main dining room of the Stevens Hotel. Tables will be arranged by classes. Your reservation is solicited by your class representative.

EDGAR W. SWANSON, *Secretary,*
25 E. Washington St.,
Chicago.

ALPHA OMEGA FRATERNITY

The Alpha Omega Fraternity will entertain visiting members at the Stevens Hotel, August 7 to 12. For particulars inquire at fraternity headquarters in the hotel or address

MAURICE S. ALTUS, *Regent,*
4753 Broadway,
Chicago, Ill.

DELTA SIGMA DELTA FRATERNITY

The forty-ninth annual meeting of Delta Sigma Delta will be held on August 7, at the Stevens Hotel. There will be an all day session with the annual banquet on the evening of the same day.

P. G. PUTERBAUGH, *Secretary,*
55 E. Washington, St.,
Chicago.

NATIONAL ALUMNI CHAPTER OF PSI OMEGA FRATERNITY

The headquarters of the National Alumni Chapter of Psi Omega will be at the Stevens Hotel, Chicago. All visiting brothers are requested to register at Psi Omega headquarters room upon arrival. The annual banquet will be held in the Tower Ballroom of the Stevens Hotel, August 7, at 6:30 p. m. All members and their guests will be welcome. Dancing will follow the dinner. The time and place in the hotel of the executive meeting of the chapter, will be posted in the headquarters.

FRED A. RICHMOND, *Secretary,*
Federal Reserve Life Bldg.,
Kansas City, Kan.

OMICRON KAPPA UPSILON

There will be a luncheon meeting of Omicron Kappa Upsilon, August 10, at the Stevens Hotel.

ABRAM HOFFMAN, *Secretary,*
311 E. Chicago Ave.,
Chicago.

XI PSI PHI FRATERNITY

The annual banquet of Xi Psi Phi will be held August 7, in the North Ballroom of the Hotel Stevens. All members of the fraternity and their wives are cordially invited to be present.

J. F. Cook, *President,*
511 S. Bonnie Brae St.,
Los Angeles, Calif.

TRANSPORTATION INFORMATION

The following information relative to fares, etc., is subject to change at any time.

RAILROADS

On account of A Century of Progress International Exposition to be held in Chicago from June 1 to November 1, 1933, all railroads have authorized reduced rates to Chicago. Those contemplating attendance at the Seventy-Fifth Annual Session of the American Dental Association, in conjunction with which will be held the Chicago Centennial Dental Congress, will benefit by these substantially reduced rates, which are even more advantageous than the usual convention rate of a fare and one-half.

To secure the latest information on rates, train schedules and accommodations, communicate with the nearest local ticket agency a week or more prior to departure.

AUTOMOBILES

There will be available for general distribution in the near future an official highway map of A Century of Progress. These maps are being distributed by member clubs of the American Automobile Association. It is contemplated they also will be available at filling stations throughout the country.

TOURISTS' CAMPS

Developments are in progress for the erection and operation of tourists' camps and parking lots in the outskirts of the city to accommodate the motorists who do not desire hotel accommodations. It is planned to locate these camps adjacent to the main highways leading into Chicago and also adjacent to some section of the city's established transportation systems. This will enable the motorist to secure comfortable living quarters and protected parking space in the suburban areas.

Rates for tourist cabin accommodations will probably be established at $1.00 or $1.25 per person per night, with cheaper rates for groups and for longer periods of stay.

For descriptive illustrated folders address: Allen Tours, Inc., 333 N. Michigan Avenue, Chicago, or Century Cabin Camps, Inc., Suite 900, 7 South Dearborn Street, Chicago.

AUTOMOBILE PARKING

The Chicago Loop district garage and open-air parking stations, with their limited facilities, will be unable to accommodate the enormous daily influx of cars during the World's Fair. As a convenience to members, attention is called to a company that will operate a huge parking terminal with accommodations for 20,000 cars, located about fifteen minutes from the Stevens Hotel. For a very limited time this company will accept advance reservations at attractive minimum rates. If interested in this service, apply at once to the Anthony Wayne Oil Corporation, 215 W. Randolph Street, Chicago, for folders with all particulars, including a map.

AIR LINES

The one way fares applying on air lines are now equivalent to approximately rail plus pullman rates, with a 10 per cent reduction on round trips. Most fares contemplate service on multimotored airplanes, and include all travel costs excepting ground transportation; also in most cases luncheons are served while aloft. *Reductions in fares and other changes undoubtedly will be made during the entire summer.* Detailed information may be obtained at any air line office.

BUS LINES

Practically every city, hamlet and village is now served by this mode of transportation, which is usually 25 per cent below railroad rates. Reduced round trip fares with a time limit of sixty days will be in effect. Going and returning by diverse routes will be optional at no extra cost. *Additional reductions in fares undoubtedly will be made during the entire summer.* Consult your local agent for latest schedule on information and fares.

LAKE TRAVEL

Great Lakes Steamship 1933 Sailing Schedules have been rearranged to provide more frequent service from all important ports. One way and round trip fares (including transportation, meals and berth), from Buffalo, Cleveland, Detroit and Duluth to Chicago are the lowest in history. Rail tickets reading via any railroad between various ports will be honored for transportation. Adjustments for meals and berth will be made by the Purser aboard the steamship. Automobiles are carried at reasonable rates.

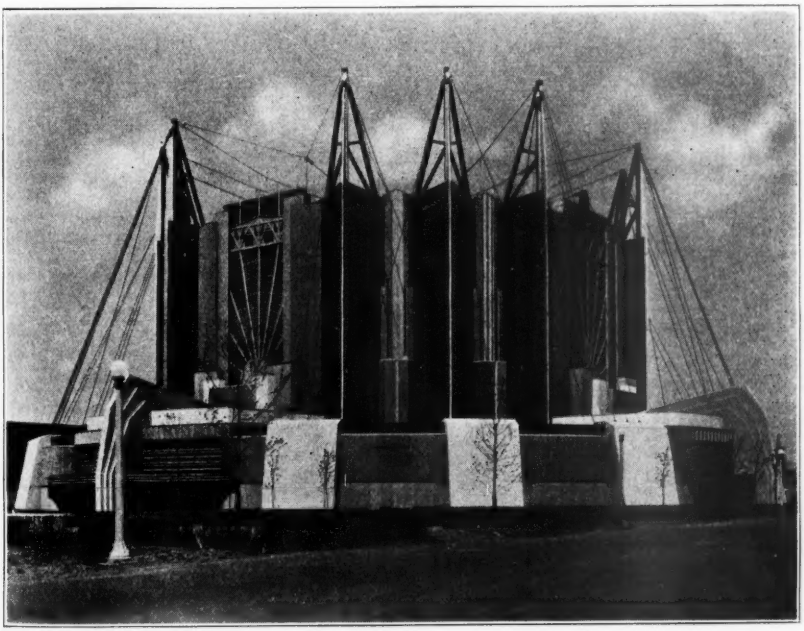
For further information apply at any steamship office.

OCEAN TRAVEL (EUROPE)

Visitors from abroad will find ocean transportation rates a real inducement to attend the Diamond Jubilee of the American Dental Association in conjunction with the Chicago Centennial Dental Congress and A Century of Progress. Reduced railroad rates (read instructions under "Railroads") will apply from all ports of entry to Chicago.

For sailing schedules, reservations, etc., see your local steamship agent.

C. H. H. Brevig, *Chairman*
Local Transportation Committee



Travel and Transport Building, A Century of Progress Exposition.

HOTELS

HOTEL	Single with Bath	Double with Bath	Twin Beds with Bath
ALLERTON 701 N. Michigan Ave.	$ 2.50 up	$ 3.00 up	$ 3.50 up
AMBASSADOR State and Goethe Sts.	3.50- 6.00	4.00- 8.00	
*ATLANTIC 316 S. Clark St.	2.50- 4.00	4.00- 6.00	
*AUDITORIUM Congress and Michigan Ave.	3.00	5.00	
BELMONT 706 W. Madison St.	4.00- 8.00		5.00-10.00
BERKSHIRE 15 E. Ohio St.	2.50 up	3.50 up	5.00
*BISMARCK 171 W. Randolph St.	3.00- 6.00	4.50- 8.00	5.00-10.00
*BREVOORT 120 W. Madison St.	2.50	3.50	
BROADVIEW 5540 Hyde Park Blvd.	2.00- 3.00	2.50- 5.00	4.00- 5.00
COMMONWEALTH 2757 Pine Grove Ave.	2.00- 2.50	4.00- 6.00	
*CONGRESS S. Michigan Ave. and E. Congress St.	3.00-10.00	6.00-12.00	6.00-12.00
CROYDON 616 Rush St.	21.00 wk.	28.00 wk.	
DALTON 1234 S. Wabash Ave.	2.00 up	3.50 up	
DEL PRADO 5307 Hyde Park Place	3.00- 7.00	5.00-8.00-9.00	
DRAKE Lake Shore Dr. and Michigan Ave.	3.00 up		5.00
EASTGATE 162 E. Ontario St.	2.50- 3.50	4.00- 5.00	4.50- 6.00
EDGEWATER BEACH 5349 Sheridan Road	3.00- 8.00	5.00-10.00	
FAIRFAX 1369 Hyde Park Place	Kitchenette	3.50 up	Double 4.00 up
FLAMINGO 5520 South Shore Drive	4.00	7.00	
*FORT DEARBORN 125 W. Van Buren St.	2.45	2.95- 3.45	Single W.O.B. 1.95
GEORGIAN 537 Deming	3.50	5.00	
GRAEMERE 113 N. Homan Blvd.	3.00	5.00	
*GREAT NORTHERN 237 S. Dearborn St.	2.50- 4.00	3.50- 6.00	
HAYES 6345 University Ave.	2.50	3.50	
HYDE PARK Hyde Pk. and Lake Pk. Aves.	2.50- 4.00	3.50- 5.00	
HARRISON 57 E. Harrison St.	2.50- 3.00	3.50- 4.00	4.50- 5.00
KNICKERBOCKER 163 E. Walton Place	3.00- 5.00	5.00- 6.00	7.00- 8.00
LAKE SHORE DRIVE 181 Lake Shore Drive	5.00 up	7.00- 8.00	7.00 up
*LA SALLE LaSalle and Madison Sts.	3.00	4.50	6.00- 7.00
LAWRENCE 1020 Lawrence Ave.	1.50 up	2.50 up	2.50 up

*In "Loop." Other hotels listed are easily accessible from the Stevens (headquarters) and the World's Fair Grounds.

HOTELS

HOTEL	Single with Bath	Double with Bath	Twin Beds with Bath
LORRAINE 411 S. Wabash Ave.	1.50- 2.50	2.00- 4.00	17.50 wk.
*MAJESTIC 29 Quincy St.	1.50- 5.00	2.50- 6.00	
MARYLAND 900 Rush St.	2.50	4.00	5.00
*MORRISON 79 W. Madison St.	3.00- 5.00	4.50- 7.00	5.00- 8.00
NORTH SHORE HOTEL Evanston	3.50 up	5.00 up	
ORRINGTON Evanston	4.00- 5.00	4.00- 5.00	
*PALMER HOUSE State and Monroe Sts.	3.50- 6.00	6.00-10.00	6.00-10.00
PARK LANE 2842 Sheridan Road	4.00	5.00- 6.00	
PEARSON 190 E. Pearson St.	3.00 up	5.00 up	
PLAZA 1553 N. Clark St.	2.00 up	3.00 up	3.50 up
RIDGEVIEW Evanston	3.00	5.00	
RIENZI 600 Diversey Parkway	2.00 up	3.00 up	
ROGERS PARK 6805 Sheridan Road	3.00	5.00	
SENECA 200 E. Chestnut St.	3.00- 4.00	4.00- 5.00	
SHERIDAN-PLAZA 4605 Sheridan Road	2.50	4.00	
SHERMAN Clark and Randolph Sts.	3.00- 5.00	4.50- 7.00	5.00- 8.00
SHORELAND 5454 South Shore Drive	4.00 up	6.00 up	6.00 up
ST. CLAIR 162 E. Ohio St.	3.00- 4.00	4.00- 6.00	Suites 10.00
SOUTHMOOR 6646 Stony Island Ave.	2.50	4.00	
SOVEREIGN 6200 Kenmore Ave.	3.00- 5.00	4.00- 6.00	
STEVENS 7th and Michigan Ave.	3.00- 6.00	4.00-10.00	6.00-12.00
STOCK YARD INN	2.00- 3.00	4.00 up	
VERSAILLES 5234 Dorchester Ave.	2.00	2.50	Kitchenette 2.50
VICTORIA 334 South Clark St.	2.50 Single W.O.B. 1.50	4.00 Double W.O.B. 2.50	Restaurant in Connection Moderate Prices
WACKER 109 W. Huron St.	2.00- 3.00	3.00- 4.00	4.00- 5.00
WARNER 3301 Cottage Grove Ave.	2.00	3.00	
WINDERMERE 1642 E. 56th St. West East	2.50- 5.00 3.50	4.00- 7.00 5.50	

The demand for hotel accommodations during A Century of Progress will be great. For this reason everyone planning to attend is urged to make room reservations as early in advance as possible. Hotels listed here are members of the Chicago Association of Commerce and the Chicago Hotel Association and guarantee that the above rates will prevail during A Century of Progress Exposition.

DIRECTORY OF COMMERCIAL EXHIBITORS

A — Booth

Abbott Laboratories 123
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White Dental Mfg. Co., The S. S. ..... 129-136 incl.
Williams Gold Refining Co., The 111
Wilmot Castle Co. 44
Worcester Salt Co. 103

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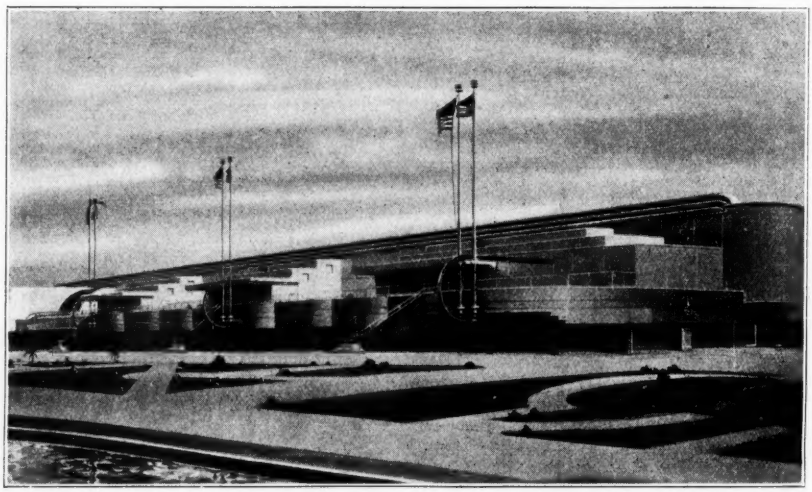
Young Dental Mfg. Co. 91



Agricultural Building, A Century of Progress Exposition.

MEMBERS OF THE HOUSE OF DELEGATES 1933

DELEGATES AND ALTERNATES

ALABAMA

Delegates

W. Sam Wilson, T. C. I. Hospital, Fairfield
James A. Blue, Corner Bldg., Birmingham

Alternates

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H. Clay Hassell, Tuscaloosa

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Alternate

Paul H. Bennett, 907 Consolidated Bank Bldg., Tucson

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I. M. Sternberg, Merchants Nat'l Bank Bldg., Fort Smith

Alternates

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J. D. Jordan, 510 Boyle Bldg., Little Rock

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Charles A. Sweet, 242 Moss St., Oakland
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Arthur R. McDowell, 344 Fourteenth St., San Francisco
John E. Gurley, 350 Post St., San Francisco
Ernest L. Johnson, 450 Sutter St., San Francisco
Jack Werner, 344 Fourteenth St., San Francisco

Alternates

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J. R. Young, Second and Main Sts., Chico
Sanford M. Moose, 450 Sutter St., San Francisco
Howard B. Kirtland, 7 Pacific Southwest Bldg., San Luis Obispo
W. G. Hughes, Madera
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Arthur E. Smith, 511 Wilshire Medical Bldg., Los Angeles
E. Ray Brownson, Roosevelt Bldg., Los Angeles

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J. Walter Gray, Medico-Dental Bldg., Los Angeles
Carl D. Lucas, 908 Brockman Bldg., Los Angeles
J. F. Christensen, Roosevelt Bldg., Los Angeles
H. C. Peisch, 65 N. Madison Ave., Pasadena
Floyde E. Hogeboom, 1203 Pellissier Bldg., Los Angeles
Walter S. Thompson, 1007 Foreman Bldg., Los Angeles

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William D. Brewster, 111 W. Main St., Waterbury
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Alternates

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Stanley E. Armstrong, 129 Whitney Ave., New Haven
Clarence E. Peterson, 34 Park Place, Rockville

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L. W. Johnston, 1108 Republic Bldg., Denver
J. G. Ewers, 925 Republic Bldg., Denver
W. O. Weber, 221 Park Place, Greeley

Alternates

R. A. Adams, 212 Metropolitan Bldg., Denver
O. H. Devitt, 523 Republic Bldg., Denver
E. G. Netherton, 1206 Republic Bldg., Denver

DELAWARE

Delegate

D. J. Casey, Medical Arts Bldg., Wilmington

Alternate

J. P. Wintrup, Medical Arts Bldg., Wilmington

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Delegates

W. W. Wyman, 724 Upshur St., N. W., Washington
B. E. Erikson, 3 E. Lenox St., Chevy Chase, Md.
Henry A. Swanson, 1726 Eye St., N. W., Washington

Alternates

A. D. Weakley, 1029 Vermont Ave., N. W., Washington
Charles D. Cole, 1835 Eye St., N. W., Washington
Sterling V. Mead, 1149 Sixteenth St., N. W., Washington

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C. C. Stewart, 709 Power & Light Bldg., St. Petersburg

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W. F. Andes, Huntington Bldg., Miami
E. L. Thompson, 326½ S. Beach St., Daytona Beach

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Harry Bledsoe, Candler Bldg., Atlanta
R. Holmes Mason, Macon

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Reginald Maxwell, Augusta
William Weischelbaum, Sr., Savannah

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V. D. Lyons, Pocatello

Alternate
John O. Lowe, Burley

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W. H. G. Logan, 55 E. Washington St., Chicago
W. D. N. Moore, 220 S. Michigan Ave., Chicago
W. A. McKee, Benton
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B. O. Sippy, 30 N. Michigan Ave., Chicago
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James C. Donelan, 322 Illinois Mine Workers Bldg., Springfield

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F. A. Neuhoff, First Nat'l Bank Bldg., Belleville
A. B. Culhane, 503 Trust Bldg., Rockford
J. R. Blayney, 2209 Rosemont Ave., Chicago
Neal D. Vedder, Carrollton
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L. D. Head, Moloney Bldg., Ottawa
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V. H. Knapp, 510 Citizens Bank Bldg., Evansville
R. R. Gillis, 134 Rimbach Ave., Hammond
F. Wade LaRue, 904 Medical Arts Bldg., Indianapolis

Alternates
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E. E. Ewbank, Kingman
F. R. Henshaw, Medical Arts Bldg., Indianapolis

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John G. Hildebrand, 207 Black Hawk Bldg., Waterloo
C. V. Watts, 315 K. P. Block, Des Moines
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L. M. Fitzgerald, Roshek Bldg., Dubuque

Alternates
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H. D. Coy, Hamburg
C. S. Foster, 803 Dows Bldg., Cedar Rapids
R. S. Sommers, 1114 Equitable Bldg., Des Moines
Henry J. Altfillisch, 722 Roshek Bldg., Dubuque

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Oscar Flener, Hopkinsville
P. H. Williams, Ashland

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L. D. Roach, Ricou Brewster Bldg., Shreveport

Alternates
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G. M. Stamper, Medical Arts Bldg., Shreveport

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H. Hayward Streett, 819 Park Ave., Baltimore

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Max K. Baklor, 2201 Eutaw Place, Baltimore
Crown O. Diehl, Hagerstown

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Philip E. Adams, 236 Newbury St., Boston
Walter J. Bryans, 97 Main St., Lee
Fred G. Rollins, 358 Commonwealth Ave., Boston
John J. Fitzgibbon, 56 Suffolk St., Holyoke
Thomas K. Ross, 280 Main St., Fitchburg
Arthur T. Palmer, 51 Broad St., Lynn

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William H. Gilpatric, 358 Commonwealth Ave. Boston
David F. Spinney, 1330 Beacon St., Boston
Louis Gross, 8 Bank Row, Pittsfield
Frank P. Barnard, 507 Main St., Worcester
J. Edward Cheney, 717 Main St., Fitchburg
George A. Harris, Taunton State Hospital, Taunton

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Ward Moore, 1426 G. R. Nat'l Bank Bldg., Grand Rapids
M. W. Prince, 7634 Dexter Blvd., Detroit
R. E. Patterson, 901 Stroh Bldg., Detroit
H. F. Parks, 1206 Reynolds Bldg., Jackson

Alternates
U. G. Rickert, 726 S. State St., Ann Arbor
W. F. Northrup, 1402 Stroh Bldg., Detroit
W. R. Davis, Michigan Dept. of Health, Lansing
J. O. Goodsell, 501 Second Nat'l Bank Bldg., Saginaw
Charles Lane, 2004 Eaton Tower, Detroit

MINNESOTA

Delegates

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C. O. Flagstad, 1549 Medical Arts Bldg., Minneapolis
E. J. Sundby, Medical Arts Bldg., Duluth
H. W. Nelson, 1747 Medical Arts Bldg., Minneapolis
D. J. Harrison, Mankato
M. E. Ernst, 1150 Lowry Bldg., St. Paul
L. M. Cruttenden, 435 Hamm Bldg., St. Paul

Alternates

T. P. Ryan, 949 Medical Arts Bldg., Minneapolis
C. W. Girvin, Brett Bldg., Mankato
M. H. Thornton, 208 Liberty Bank Bldg., St. Paul
C. C. Sparrow, 618 LaSalle Bldg., Minneapolis
O. J. Merwin, Randolph St. and Snelling Ave., St. Paul
T. B. Hartzell, 710 Physicians and Surgeons Bldg., Minneapolis
C. E. Rudolph, 905 Metropolitan Bank Bldg., Minneapolis

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Delegates

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L. H. Hughes, Jackson

Alternates

W. R. Wright, Jackson
A. J. Price, Gulfport

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Delegates

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R. J. Rinehart, 1024 E. Tenth St., Kansas City
Tom E. Purcell, Altman Bldg., Kansas City
B. O. Haun, Missouri Bldg., St. Louis
J. F. Alcorn, 813 Beaumont Medical Bldg., St. Louis
William M. Bartlett, Wall Bldg., St. Louis

Alternates

Russel G. Fobes, Wall Bldg., St. Louis
Ralph W. Edwards, 17 E. Sixty-Fifth St., Kansas City
O. F. Freitag, 555 Stratford Ave., University City
E. L. Mayer, 3606 Gravois Ave., St. Louis
J. C. Warnock, 807 Professional Bldg., Kansas City
J. H. Williams, 3720 Washington St., St. Louis

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Delegates

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J. E. Buehler, 409 Ford Bldg., Great Falls

Alternates

T. M. Hampton, Helena
R. D. Curry, Dillon

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Delegates

E. H. Bruening, City National Bank Bldg., Omaha
F. A. Pierson, 1014 Federal Trust Bldg., Lincoln
H. E. King, Insurance Bldg., Omaha

Alternates

E. A. Thomas, Hastings
F. F. Whitcomb, Medical Arts Bldg., Omaha
G. A. Grubb, Andrews Hall, University of Nebraska, Lincoln

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Delegate

A. F. Pottle, Meredith

Alternate

E. S. Kent, Portsmouth

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Frederick H. Lum, Jr., 151 Main St., Chatham
William H. Gelston, 40 N. Thirtieth St., Camden
George H. Grim, 695 Bergen Ave., Jersey City
John S. Owens, 109 N. Fifth St., Camden
Kenneth C. Pruden, 44 Church St., Paterson
E. J. H. Schneider, 519 Prospect St., Maplewood
George H. Martin, 921 Bergen Ave., Jersey City

Alternates

R. E. Mulholland, 541 Broadway, Long Branch
Joseph R. Walsh, 67 S. Clinton St., East Orange
Craft A. Hopper, 45 Church St., Paterson
E. L. D. Hester, 34 E. Palisade Ave., Englewood
Walter A. Schilke, 44 E. Palisade Ave., Englewood
Frank T. Maxson, 49 Bleecker St., Newark
Jacob M. Wisan, 1143 E. Jersey St., Elizabeth
Charles Faupel, 484 Bergen Ave., Jersey City

NEW MEXICO

Delegate

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Alternate

C. E. Hagland, Albuquerque

NEW YORK

Delegates

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Clyde M. Gearhart, 17 Park Ave., New York City
Waldo H. Mork, 100 W. Fifty-Ninth St., New York City
John L. Peters, 133 W. Seventy-Second St., New York City
Alfred Walker, 100 W. Fifty-Ninth St., New York City
Joseph A. Burgun, 184 Joralemon St., Brooklyn
Charles M. McNeely, 1 Nevins St., Brooklyn
Fred R. Adams, 8 W. Fortieth St., New York City
D. E. Hurley, 80 Fourth St., Troy
H. R. Mead, 619 Union St., Schenectady
E. M. Crysler, Watertown
Wells Howland, 904 Press Bldg., Binghamton
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H. J. Kauffer, 57 W. Fifty-Seventh St., New York City
Arthur S. Litten, 230 Central Park W., New York City
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P. C. Knapp, 112 Oneida St., Fulton
Ferdinand Haase, Elmira
Ralph S. Vorhees, Jr., 311 Alexander St., Rochester
G. G. Burns, Professional Bldg., Rochester
Harry F. Tanner, Medina
William N. Brewer, 1207 United Bldg., Niagara Falls
G. S. Writer, Nyack
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Alternates

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D. P. Snyder, 137 E. State St., Columbus
T. I. Way, Doctors Bldg., Cincinnati
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J. V. Gentilly, Rose Bldg., Cleveland
P. J. Aufderheide, Rose Bldg., Cleveland
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W. H. Wolford, Mansfield
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F. W. Meacham, Hamilton Nat'l Bank Bldg., Chattanooga
W. W. Oursler, 915 Madison Ave., Memphis

Alternates
Hershal A. Graves, Doctors Bldg., Nashville
D. P. Houston, First Nat'l Bank Bldg., Chattanooga
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F. M. Hight, 1325 Medical Arts, Houston

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Sam Brock, 1318 Medical Arts Bldg., Dallas

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VERMONT

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T. Wood Campbell, Suffolk
S. D. Kent, Arcade Bldg., Danville

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W. N. Hodgkin, Warrenton
N. Talley Ballou, State Board of Health, Richmond

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A. W. Jeffery, Medical and Dental Bldg., Seattle
C. T. Fleetwood, Medical and Dental Bldg., Seattle
W. I. Ferrier, Medical and Dental Bldg., Seattle

Alternates
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E. M. Jones, Cleveland Clinic, Burlington
R. E. Plummer, Medical and Dental Bldg., Seattle
C. F. Lindley, Medical and Dental Bldg., Seattle

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H. E. Summers, Huntington Nat'l Bank Bldg., Huntington

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J. Bernard Poindexter, Professional Bldg., Huntington

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Alternate
W. L. Darnal, U. S. Naval Hospital, San Diego, Calif.

U. S. PUBLIC HEALTH SERVICE

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C. T. Messner, U. S. Public Health Service, Washington, D. C.

Alternate
C. W. Wekeman, U. S. Marine Hospital, Chicago, Ill.

U. S. VETERANS BUREAU

Delegate
Lloyd Y. Beers, Washington, D. C.

Alternate
C. A. Couplin, Hines, Ill.

CURRENT LITERATURE

Identification by Means of Teeth (B. H. Humble, Brit. D. J., May 15, 1933): There are two methods of identification by the teeth: (1) a body may be identified by teeth, either natural or artificial, or (2) identification may be made by tooth marks. In seven historic cases given, the identity was determined by the first method. In three cases of identification by tooth marks, the possibilities of the method are illustrated. The usefulness of this means of identification depends primarily on the accuracy of dental records. Parallels could then be drawn between the condition described and the records. Other interesting ways and means of identification are detailed by the author.

N. G. T.

Micrognathia—A Suggested Treatment for Correction in Early Infancy (A. D. Davis and R. Dunn, Am. J. Dis. Child., April 1933, p. 799): The article begins with a case report: A child born at term, normal in all respects save for a cleft palate, a distally occluding mandible and an undersized tongue. The incisor region of the mandible met the maxillae near the tuberosities. The chin was distinctly retruded. The angle of the jaw was definitely right angular. Abnormality existed entirely in the mandible. The authors discuss the possible fetal development that accounted for the condition. Realizing that naturally the upper jaw develops anteriorly to the lower and that a child in nursing normally presses the upper against the breast and reaches with the lower to effect suckling, they attempted a program that would exaggerate this process. An attachment was put on the bottle to accomplish this result, the mother being instructed to move the appliance forward on the bottle every few days. Photographs show the remarkable improvement made in eleven months.

N. G. T.

An Antiseptic for Dental Use (Paul Pincus, Australian J. Dent., April, 1933, p. 139): Dr. Pincus notes the need of an unbroken chain of asepsis in the dental "surgery." Only a minority of dentists have an autoclave. Some of the trouble following extractions is due to lack of sterilization. He advocates the use of potassium phenate in water (4 drams each of phenol and potassae is allowed to stand twenty minutes, then water is added to make 80 ounces, the mixture is shaken at intervals, and it is ready for use). The main uses of the solution are to cool instruments after boiling, to keep them sterile during use, to soak swabs and to sterilize instruments that may be hurt by boiling. This solution is antiseptic, detergent, anodyne.

N. G. T.

Electrogalvanic Lesions of the Oral Cavity Produced by Metallic Dentures (E. S. Lain, J.A.M.A., March 11, 1933, p. 717): In an article published in the *Archives of Dermatology and Syphilis,* January, 1932, the author discussed lesions of the oral cavity caused by electrogalvanic discharges between dissimilar metals used in restorations. He reported thirty cases. Since that time, 300 additional cases have been studied. As a result, Dr. Lain reaches certain definite conclusions. Human saliva, whether acid or alkaline, makes a good electrolyte. Through it, metallic electrons circulate freely from higher to lower potentiality. Thus, a complete galvanic battery is formed. The objective electrochemical changes that take place are discoloration, erosion, disintegration, loosening of fillings or crowns and possible maladjustment of plate dentures. Objective symptoms of the oral tissues are acute or chronic inflammation and the presence of blanched or grayish patches, areas of erosion or ulcers. Erosion and the development of ulcers or leukoplakia occur directly beside the dentures and hence the term "galvanic burns" is justified. Also, pigmentation of the mucous membrance has been observed. The influencing conditions are the volume of the dissimilar metals, the chemical variations of the saliva (hyperalkalinity or hyperacidity increases the current generated), the resistance of the tissues and the distance between the dentures. Positive cases of such injuries are

relieved by the removal of the offending dentures.

N. G. T.

Persistent Dermatitis—An Unusual Sequela of Radical Operation for Trigeminal Neuralgia (E. W. Netherton, J.A.M.A., March 11, 1933, p. 772): Netherton observes the advance of neurologic surgery and the attendant safety of trigeminal section and reports a case of persistent dermatitis. The patient had had a subtotal resection (Frazier's method) of the sensory root of the left fifth cranial nerve. The postoperative course was uneventful. The patient was relieved of pain, but complained of numbness. She remained in good health for six years, when a dermatitis appeared. The eruption would almost disappear and become inconspicuous for four or five days at a time. Exposure to heat, cold, wind, soap and water made the condition very noticeable. At times, the plaque was red and weeping. As the attack subsided, a small dry adherent scale developed. Vesicles never appeared. A search of the literatures showed the condition to be very rare, although some reports of similar cases have been made by prominent neurologic surgeons.

N. G. T.

Health Education Over the Radio (W. W. Bauer, Illinois M. J., May, 1933, p. 444): Dr. Bauer presents a general analysis of the radio situation, as nearly as possible the number of radio sets in use, the hour of maximum listening and the programs chosen, and makes an appraisal of the manner of presentation of programs. He classifies health education programs as follows: Those sponsored by (1) organized medicine; (2) organized health agencies, either official or volunteer; (3) commercial organizations; (4) health cults, quacks and faddists; and (5) various combinations of the preceding types. Naturally, he emphasizes the superior dependability of the first three, with due regard for the fourth within limits. He earmarks the cultist as follows: He is ignorant, sponsors unsound theories, is crooked and sees a chance to make money, is boastful and abusive, uses testimonials, offers free books or trial treatments and claims to cure incurable disease. Bauer presents interestingly the ethical phase of broadcasting, and avers that an ethically sponsored program is safe to listen to; i. e., the listener will not be misled.

N. G. T.

The Reparative Action of the Dental Tissues Following Severe Injury (G. B. Pritchard and V. A. F. Greenish, Brit. D. J., May 15, 1933): Dr. Pritchard reports a case of fracture of a lateral incisor by a fall which devitalized the other three incisors. The fractured left lateral incisor—the break was one-eighth inch above the neck—was retained for some time after the injury. The tooth was eventually removed, and although the pulp had stayed alive and tissue responses and osteoid tissue and secondary dentin formation had taken place, union had not occurred. The second specimen was a central incisor, fractured one-quarter inch from the apex and removed at some later unstated time. A layer of cementum was shown on the fractured surface filling in a v-shaped depression on the coronal piece. The entire fractured surface of the radicular piece is covered with cementum.

In the case reported by Greenish, the tooth was also broken by a fall. Tested, it showed vitality. Dr. Greenish splinted the injured tooth to its neighbors and photographed it periodically for approximately four years. The parts are evidently completely united.

N. G. T.

Diagnosis and Treatment of Trigeminal Neuralgia (Albert M. Cram, New England J. Med., p. 1003): The author regards it as plausible that trigeminal neuralgia is an ascending neuritis due to some chronic infection, with a sclerosis of the gasserian ganglion, or, in the rare incurable case, extended into the more central origin of the nerve. Of this, there is no proof. A complete descriptive and diagnostic presentation is given. Cram emphasizes the need of diagnosis before the patient has lost all his good teeth. Treatment he divides into medical and surgical, the medical only, as a rule, a relief measure until a positive diagnosis is made and the patient's condition permits an operation. With certainty as to the diagnosis, the case becomes a surgical one. This treatment he again divides into palliative (injection) and total or subtotal section of the sensory root between the pons and the gasserian ganglion. He discusses the different materials that have been employed for injecting and the procedure for each nerve branch; also the section procedure, its history and prognosis.

N. G. T.

Focal Infection in Relation to Cardiac and Vascular Disease (W. H. Streitman, Califor-

nia & West. Med., May, 1933, p. 358): The stated object of the paper is to emphasize facts long known. The author lists the causative organisms, quoting the findings of Thayer and Preble. As to myocardial disease, he reports the assertion of White that focal infection may aggravate conditions already existing and that such conditions as apical abscesses of the teeth, sinusitis, pyelitis and prostatitis appear to be responsible for relatively unimportant disorders of cardiac rhythm. Measures to eliminate foci are usually justifiable and may give temporary relief or at least cause improvement. White warns against removing more than a few infected teeth at one sitting and concludes that "the wisest course is to view focal infections, so far as the heart is concerned, neither with overmuch fear nor with excessive disregard." Streitman questions White's conclusions and states that he has seen infective processes cured with good heart function following and has seen angina disappear after the removal of tonsils and infected teeth. He urges the removal of foci.

N. G. T.

Diathesis as a Cause of Disease (F. W. Broderick, D. Rec., May, 1933, p. 230): Dr. Broderick asks two questions: 1. Why is it that the two conditions, dental caries and pyorrhea, show themselves principally in two completely different types of individuals? 2. What is the meaning of the very definite association of one type of dental lesion with a certain type of general disorder, for instance, dental caries with one and pyorrhea with another; caries associated with rheumatoid arthritis and pyorrhea with osteoarthritis? The dental lesion present with gastric ulcer is pyorrhea; with pernicious anemia is found caries. Other illustrations are given. Simple bacteriology does not explain these phenomena. Here, one is not dealing with bacteria as the seed of disease, but rather with the soil in which the seed grows. Now comes the question of the differences in the soils. This is diathesis. The finality of serum and vaccine therapy is ruled out. Dr. Broderick divides humanity into "slenders" and "heavies" and takes the height:weight ratio as his standard. This coincides with the sympathetic and parasympathetic relationship, the predominance of one over the other resulting in "slenders" or "heavies," the sympathetic dominance producing excess catabolism and acid formation, the parasympathetic in excess producing increased anabolism and excess alkali. Here, too, the glands of internal secretion come into the picture; psychology and physiology relate themselves to the problem; the extrovert and introvert. "I believe," the author says, "that there is no doubt that dental caries rests upon a predominance of the sympathetic portion of the involuntary system occurring in persons who have a relatively great expenditure of energy, the slenders, those with a tendency to overactivity of the thyroids and adrenals—the introverts. The opposite for pyorrhea."

N. G. T.

Contribution to the Diagnosis of the Individual by the Examination of Traces of Saliva (L. Lattes, Boll. Soc. Internaz. Di Microbiol., March, 1933, p. 585): Lattes would add the examination of saliva to the methods of criminal investigation and determination. The salivary groups correspond with the blood groups of the same individual. He mentions the work of Yamakami, Lehrs, Putkonen, Cuboni, Schiff and Busotti as assuring that saliva contains the *groupe specifique* substances found in the blood. Asoda and Kan Itioside also affirm that they have found the same in faint traces. Dry as well as moist salivas are serviceable. Lattes presents the case of a murder in which three cigaret stubs were found which had been smoked either by the murderer or the victim. The accused belonged to group B, the victim to group O. Lattes did extensive experimentation on individuals representing the four groups and gives his technic in detail. Group A and O were both negative, nondeterminable; hence, inconclusive. Finally, the total population represents a ratio of 1:10 per group; hence, finality seems impossible. The examination reduces the area of possibility and intensifies suspicion.

N. G. T.

New Paths in the Therapy of Teeth with Inflamed Pulps (G. Feldman, Vierteljahrsschr. f. Zahnheilk, 48:210, 1932): The guiding principle in the treatment of teeth with inflamed pulps is asepsis without the use of any sort of irritating antiseptic agents. The treatment of the pulp wound that results from the removal of the inflammatory focus should be based on the biologic principle of noninterference with the healing processes. The dentin splinters offer an excellent plastic material and should be used to cover the

wound. They form a type of biologic implant and activate the pulp tissue. Irregular dentin and metaplastic bone form in the pulp and lead to a complete obturation of the pulp canal so that the root stump of the pulp becomes isolated from the oral cavity. After the amputation of the inflamed coronal portion of the pulp, the root portion does not disintegrate, but maintains its structure and function. In the presence of the implant, it produces irregular dentin and osteoid tissue so that the wound is sealed hermetically by a bonelike scar. The root portion of the pulp is gradually and eventually replaced by bone tissue. This study was made on dogs.

ISAAC SCHOUR.

The Significance of Epithelium in the Periodontal Space (Guido Fischer, Vierteljahrsschr. f. Zahnheilk, 48:413, 1932): The periodontal membrane contains rests of Hertwig's epithelial sheath, the so-called rests of Malassez. Their netlike arrangement is found frequently in herbivora, but rarely in man. The presence of the epithelial sheath influences the formation of the root and to a greater extent at the time of the eruption of the tooth than later. The epithelial rests are found most commonly at the apical foramen, near the neck of the tooth and at the bifurcation of the multirooted teeth. As a rule, the epithelial rests arise only from the outer layer of the epithelial sheath. When they are derived from both the inner and outer layers, formation of enamel drops may result. The simple rests of Malassez take part in the epithelial lining of the dental cysts. At the apical foramen, the functional capacity of the periodontal membrane persists in spite of the disintegration of the pulp. Here, the periodontal membrane builds by means of proliferating connective tissue an abscess membrane which can penetrate the canal and deposit secondary cementum or bone.

I. S.

Public Oral and Dental Care in Norway (Jacob Ramm, Norsk Tannlaegefor. Tid., April, 1933, p. 178): The author divided this service into six groups: 1. The service rendered by institutions with state or county assistance. 2. Private employe group service in connection with the larger state enterprises. 3. Children's dentistry rendered through private assistance. 4. The state and county dental care for school children. 5. Hospital dentistry. 6. Dentistry rendered in military camps. 1. In the Norwegian "sickness insurance law" only extractions are covered and, oddly enough, root amputations. The funds are collected as follows: three-sixths from the insured, one-sixth each from the state, the employer and the county. The service is rendered by any dentist. 2. This group is an extension of Group 1 to cover all forms of dentistry. The group covers a part (usually one-third) of the expense. 5. Nine hospitals have dentists, two of whom are physicians. 6. The dental service usual in military camps is afforded. 3. This group is closely connected with group 4, the main group in Norway, the only difference being that the necessary money is obtained privately. Group 4 comprises what Norway has of real public dental care. The clinics for the care of school children by dentists hired by the county have developed along the lines drawn by the Norwegian Dental Society in 1917. Now there are thirty-eight clinics in the towns and thirty-six in the rural districts. One hundred and fifteen dentists are engaged in the clinics, fifty-two being full time workers (six hours daily). The clinics are mostly connected with the dentists' private offices, but if the town is large enough, every school has its own clinic (Oslo) or a large common clinic in one school takes care of the others (Bergen). In Trondheim, the central clinic is not connected with any school. The service includes all types of children's dentistry. The expenses are met by the state (one-eighth of the salaries), county and local "sickness insurance groups."

E. G. JACOBSON.

An Unusual Case of a Mandibular Fracture (Leonard Widman, Svensk Tandlak. Tidskr., March-April, 1933, p. 65): The author reports a case of mandibular fracture caused by the faulty use of an elevator in the removal of the roots of a lower right second molar. This fracture healed promptly, but a damage suit against the dentist was instituted. The author has been able to find but one similar case in dental literature. He stresses the necessity of extreme care in the use of elevators in extraction as they (particularly the American types) develop immense force. He advises "surgical removal" in difficult extractions.

E. G. J.

A Case of Atypical Multiple Fracture of the Mandible (Hans Kjoerholm, Tand. Geblad., April 1933, p. 217): In the case reported, the patient was kicked in the face by

a horse and though roentgen-ray examination revealed several fracture lines, no attempt was made at fixation. When, after a month, no callus formation had taken place, a new examination was made and the extent of the damage determined. One fragment held the lower left incisors. Another fragment extended from the lower right cuspid to the lower left first molar, taking in the lower border of the mandible. Its superior border was below the root-ends of the lower teeth. This fragment was displaced lingually. An extra-oral bandage was used for fixation in connection with wiring. In three months, healing took place with normal occlusion.

E. G. J.

MISCELLANY

BOOK REVIEWS

Diet in Sinus Infections and Colds. By Egon V. Ullman, M.D. Published by The Macmillan Company, New York, 1933.

The title of the book has a distinct advantage. It is different, and that is meaningful. The book is intended for the laity, although the necessary shadow of the physician falls across its pages. People know little of the sinuses, although familiar with them as the source of trouble. The first chapter will add something to the conversational cargo of the curious. "General Advice to People Suffering from Colds" and "Food and Civilization" will hold lay interest. It puts within easy compass what visitors to physicians and druggists have been repeatedly told. Chapters V to XIII discuss foodstuffs *ad seriatim* briefly and with the ever present flavor of personal authority. Chapter XII treats water economy—broth and soups in particular, making an interesting analogy between them and the urine. "The only difference between meat broth and excretions lies in the comparatively little change to which these substances are subjected on their way to and through the kidneys." That will seem to the housewife a bit brash even though true.

The book contains 126 pages of treatise material, four pages of references, twenty-two pages of recipes and menus, a good general index and an index for recipes. The whole is artlessly written and totals a fair cook book in competition with many superior ones.

N.G.T.

Notes on Vitamins and Diets. By Daniel Thomas Quigley, M.D. Published by Consolidated Book Publishers, Inc., Chicago, 1933.

The book purposes to open to the general reader the history of vitamins, their sources and their rôle in the maintenance of health. Esteeming their importance, the author would make knowledge of them available to all. This he does effectively. It is a brief text, very readable, giving enough history and essential illustrations to hold the attention. He makes each page creative of interest and in simple language presents biologic, pathologic and laboratory facts and conclusions in an easy but dignified manner. Chapter heads that will catch the eye of the intelligent layman are "High Blood Pressure and Heart Disease," "Anemia," "Tuberculosis and Rickets," "Colds and Other Respiratory Infections," "Cancer"; titles that are indigenous to common conversation. It is in every sense a layman's text authoritatively written.

N.G.T.

The Vitamins in Health and Disease. By Barnett Sure, Ph.D., Professor of Agricultural Chemistry, University of Arkansas. The Williams and Wilkins Company, Baltimore, Md., 1933.

The foreword of the text is written by Walter H. Eddy of Columbia University. In it, Dr. Eddy asks "What human effects result if vitamins are omitted from the diet?" He mentions the need of an authoritative summation of such information in simple understandable language for lay readers. This Dr. Sure undertakes to do and does to the limit of present-day knowledge. But the book is not only for popular reading: it is adapted to the need of clinicians and investigators as well. To each vitamin, a chapter is devoted, with a history of the research done on it and the rôle of the vitamin in its relation to health and disease. Under the caption "The Vitamin Content of Foodstuffs," well devised tables are added. Complete indexes of authors and content are at

the reader's service. The text is well written. The type used presents a pleasing page and is easy to read. The volume consists of 206 pages and is well bound and attractive. The book is a definite and desirable addition to the literature on the subject. N.G.T.

Year Book of the American Pharmaceutical Association—1930. Vol. 19, containing the seventy-third annual report on the progress of pharmacy, the roster, a list of former officers, the constitution, by-laws, articles of incorporation, code of ethics, history of funds, treasurer's report and roll of members; corresponding to volume 78 of the former Proceedings of the American Pharmaceutical Association; 428 pages. Baltimore, Md.: American Pharmaceutical Association, 1933.

The Year Book of the American Pharmaceutical Association is an established institution of this association. In addition to transactions of the association and related material, there are a number of abstracts prepared from the literature of pharmacy and the allied sciences, which constitute the report on the progress of pharmacy for the year 1930. The book will have no immediate usefulness to the practicing dentist, but for those dentists and others interested in the interrelationships of pharmacy and dentistry, there is much useful information. As an example of the information that might be useful to the dentist may be mentioned several abstracts on the chemical and photochemical oxidation of commercial adrenalin solutions, several references on tooth pastes, references to newly prepared organic compounds with potential antiseptic action, references to local anesthetics of diverse chemical constitution, and the bio-assay of procaine-epinephrine mixtures. The average druggist is, as a rule, occupied with the business of making a living, and these selected abstracts aid in keeping him posted on the advances being made in his profession. The American Pharmaceutical Association has rendered a service to its members by the preparation of the volume. S.M.G.

Text Book of Orthodontia. By Robert H. W. Strang, M.D., D.D.S. Published by Lea & Febiger, Philadelphia, 1933.

The book, externally and internally, is a work of art, of laborious, well-directed art. The dentist who is a layman as to orthodontia would necessarily be impressed by the clarity of type and cuts and the readable style. The author has omitted nothing that would aid in making his book serviceable to undergraduate and graduate student alike. Two chapters appealed to the reviewer as distinctly new in book making on the subject: "Facts of Historical Interest to the Orthodontist," and, "The Treatment of Abnormal Muscular Tissues and Actions." Some cuts used have become classical to dentistry, those taken from Noyes' "Dental Histology." It would be difficult to find illustrations of development of jaws and teeth equal to them. But there is not an inferior illustration in the book. In this respect, expense has not been spared. Oppenheim's experiments, a landmark in orthodontic research demonstrating bone changes in response to tooth movements, are given the place they merit. The system of orthodontia illuminated and simplified is Angle's. Practitioners devoted to other systems will concede Strang's work to be superiorly done. The book contains thirty-three chapters, 584 figures and a complete index, the total comprising 756 pages. N. G. T.

The Status of Dental Journalism in the United States. (Report of the Commission on Journalism of the American College of Dentists.) In paper cover, $4.00; cloth-bound, $5.00.

A complete survey of dental journalism, containing a history, a study of trade-house relationships and influences, nineteen tables of detailed data and statistics, an analysis of the conditions in dental journalism, conclusions and recommendations of the Commission and constructive critical comment regarding each of the important dental periodicals, and a bibliography on dental journalism from 1839 to 1931. A copy of this 238 page work should be in every dental and medical library, and should be read by every dentist with sufficient pride in his profession to wish to see its journalism elevated to a dignified status. Copies can be obtained from Albert L. Midgley, 1108 Union Trust Building, Providence, R. I.

Books Received

Dental Bibliography. A Subject Index to the Literature of Dental Science and Art as Found in the Libraries of The New York Academy of Medicine and Bernhard Wolf Weinberger, with Additional Reference Index. Compiled by Bernhard Wolf Weinberger, D.D.S., Librarian of the First District Dental Society, Consultant Librarian on Den-

tal Literature, New York Academy of Medicine. Part II. Published Under the Auspices of The First District Dental Society, State of New York, 1932. Awarded the Benjamin Lord Prize by The First District Dental Society of the State of New York 1932.

Facultad Odontologica De La Universidad Nacional Autonoma De Mexico. Mis Investigaciones Sobre La Denticion En 15,240 Ninos Y 782 Adultos Habiendo Hecho 28,557 Examenes. Presentacion De Mi Metodo Original Y Preciso Para Llevar A Cabo Estas Investigaciones Con La Mayor Exactitud. Contribuciones Al Estado Actual De Los Conocimientos Sobre Estos Temas Para La Resolucion De Sus Problemas. Tesis Que Presenta Yury Kuttler Para Obtener El Titulo De Cirujano Dentista. Mexico, D.F., 1933.

Card Index to Periodical Literature Now Available

A set of dental index cards for journals, published in January and February 1933, has just been received from the Committee on Dental Index. These cards are arranged in a classified subject index, an alphabetical author index and a list of books reviewed. The main subdivisions of the classified subject index are indicated with blue guide cards. Index cards for subsequent months will be available, according to Dr. Black, at intervals of about three weeks until the indexing is caught up with sufficiently to make it possible to send out the cards during the month following publication of the journals. It is expected that about 300 cards will be needed each month to index the dental publications and it is hoped that this service can be furnished at a cost between $3.00 and $5.00 a month. It is essential that there be some form of index to the dental periodical literature, but this plan can be continued only through the support of school dental libraries and other interested dental groups and individuals. Further information in regard to the classified card index may be obtained from Arthur D. Black, of the Committee on Dental Index.

RESOLUTIONS ON STATEMENT IN THE FINAL REPORT OF THE COMMISSION ON MEDICAL EDUCATION

The following resolution was unanimously passed by the Nebraska State Dental Society during the last annual meeting, May 15-18, 1933:

"Whereas, a commission representing the Association of American Medical Colleges, and known as the Commission on Medical Education, which has been conducting a study of medical education, has published in book form a "Final Report of the Commission on Medical Education," and

"Whereas, on pages 216-217 of said final report, the commission records its opinion that "dentistry should be developed *under* medical education," and

"Whereas, no evidence is available of any effort on the part of the commission to discuss this subject with an existing similar commission, known as "The Committee on Survey of the Dental Curriculum," with the American Association of Dental Schools, or with any authoritative body, interested in and familiar with dental education or "dentistry," and

"Whereas, the Carnegie Foundation Survey of Dental Education by William J. Gies of New York City recommended that the practice of dentistry be maintained as a separate entity, and

"Whereas, the past and present relationship between the medical and dental educational bodies has been cordial; therefore, be it

"Resolved, that the Nebraska State Dental Society in annual session convened does hereby by affirmative vote disapprove of the actions and suggestions of the Commission on Medical Education, for the subjugation of the dental profession."

F. A. Pierson, *Secretary*

The following resolution was passed by the Pennsylvania State Dental Society:

Whereas, a commission representing the Association of American Medical Colleges, and known as the Commission on Medical Education, which has been conducting a study of medical education, has published in book form a "Final Report of the Commission on Medical Education," and

Whereas, on pages 216-217 of said final report, the commission records its opinion that "dentistry should be developed *under* medical education"; and

Whereas, no evidence is available of any effort on the part of the commission to discuss this subject with an existing similar commission, known as "The Committee on Survey of the Dental Curriculum," with the American Association of Dental Schools, or with any

authoritative body interested in and familiar with, dental education or "dentistry"; and

WHEREAS, the conclusions of the Commission on Medical Education concerning dentistry are most astonishing; therefore, be it

Resolved, that the Pennsylvania State Dental Society in annual session convened does hereby unanimously disapprove of the actions and suggestions of the Commission on Medical Education, for the subjugation of the dental profession. Such suggestions are neither impressive nor persuasive, are hopelessly illogical and would degrade dentistry and demoralize dental service; and be it further

Resolved, that copies of this resolution be sent to the Council on Medical Education of the American Medical Association, to the members of the Commission on Medical Education, to the American Association of Dental Schools, to the deans of the medical and dental schools in North America, and to leading journals in medicine, dentistry and other health-service professions.

PRIZE ESSAY FOR THE CENTENNIAL DENTAL MEETING

New York, Dec. 3-7, 1934.

The Centennial Commission of the First and Second District Dental Societies of the State of New York announces the following to be awarded for suitable essays, at the discretion of the prize committee:

A series of suitable engraved Centennial medals to each individual submitting the most acceptable paper between 500 and 2,000 words in length which embodies the result of original research or study not previously published.

In addition to the medals, the papers are eligible for:

1. The 1934 "Morris L. Chaim Prize" of the First District Dental Society. This prize of $250 is for the best paper in the field of science and art as related to dentistry.

2. The "Benjamin Lord Prize" of the First District Dental Society for 1934, of $150, in the field of clinical dentistry, having an immediate and direct value to practical needs.

3. The "Frank T. Van Woert Prize" of the Second District Dental Society, of $100 for the best paper on "Dental History."

4. The "Thaddeus P. Hyatt Prize" of the Second District Dental Society, of $100 for the best paper on "Preventive Dentistry."

The manuscript of the winning papers, or others selected, and any accompanying photographs, drawings, charts, etc., will become the property of the Centennial Commission.

Further information may be obtained by addressing: The Centennial Dental Commission, Academy of Medicine, 2 East 103d St., New York City.

BERNARD WOLF WEINBERGER, *President*

ANNOUNCEMENTS*

CALENDAR OF MEETINGS

American Dental Association in conjunction with the Chicago Centennial Dental Congress, Chicago, Ill., August 7-12.

American Academy of Periodontology, Chicago, August 3-5.

American Dental Society of Europe, Holland, August, 1934.

American Full Denture Society, Chicago, August 6-7.

American Society for the Promotion of Dentistry for Children, Chicago, August 7.

American Society of Oral Surgeons and Exodontists, Chicago, August 4-5.

American Society of Orthodontists, Oklahoma City, Okla., November 8-10.

Association of American Women Dentists, Chicago, Ill., August 7.

Association of Military Dental Surgeons, Chicago, August 8.

Fédération Dentaire Internationale, Edinburgh, July 22-27.

International Congress of Radiology, Zurich, Switzerland, July 24-31, 1934.

Society for Advancement of General Anesthesia in Dentistry, New York City, third Monday in February, April, October and December.

National Association of Dental Examiners, Chicago, August 7.

American Dental Assistants Association, Chicago, August 7-12.

American Dental Hygienists' Association, Chicago, August 7-12.

District of Columbia, at George Washington University, Washington, D. C., second and fourth Tuesdays in each month from October to June, inclusive.

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*Announcements must be received by the fifth day of the month in order to be published in the forthcoming issue of THE JOURNAL.

STATE BOARD OF DENTAL EXAMINERS

Montana, at Helena, July 10-15. T. P. Regan, Secretary, Helena.

North Dakota, at Fargo, July 11-14. R. E. Percy, Secretary, Mandan.

AMERICAN DENTAL SOCIETY OF EUROPE

The next annual meeting of the American Dental Society of Europe will take place beginning in August, 1934, in Holland.

EDWARD J. ORTION, *Secretary*
14 Rue Cristophe Colomb
Paris, France

FOURTH INTERNATIONAL CONGRESS OF RADIOLOGY

The Fourth International Congress of Radiology will be held under the presidency of Prof. H. R. Schinz, July 24-31, in Zurich, Switzerland. The Congress may be attended by members of radiologic societies in all countries and persons introduced by such societies. The thirty-two countries which were represented at the Third International Congress, in Paris, have been invited by the organizing committee to appoint delegates to the international committee and to nominate a speaker to report on the organization of the cancer campaign in his country at the opening session. All radiologic societies are requested to send a list of their members as soon as possible to the general secretary, Hans E. Walther, Gloriastrasse 14, Zurich.

THE SOUTHERN SOCIETY OF ORTHODONTISTS

The annual meeting of the Southern Society of Orthodontists which was to have been held at Hot Springs, Va., November 13-15 has been postponed until further notice.

WILLIAM P. WOOD, JR., *Secretary*
442 W. Lafayette St.
Tampa, Fla.

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1932-1933

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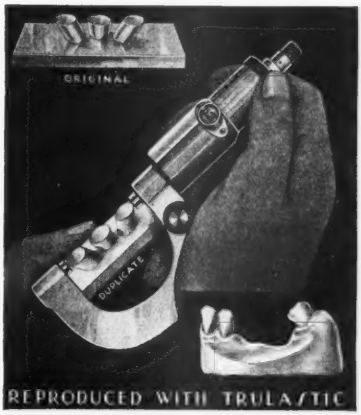

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Forms Close on 1st of Month Preceding Month of Issue

MISCELLANEOUS

BUR RECUTTING now at 20c per dozen—assorting in 1 dozen packages included—Testmonials on hand. The new "S" Bur (Wolfram Steel) 3 dozen $1.00. SCHEUN & CO., 6612 Sheridan Rd., Chicago. Established 1906.

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FOR SALE

FOR SALE—Transactions of the American Dental Association for the years 1912, 1913, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929, 1930, and 1931, at $1.00 per copy. As there are only a few available, orders will be filled as long as they last in the order in which they are received. Address A1499, care American Dental Association, 212 E. Superior St., Chicago, Ill.

FOR SALE—The long-established and profitable dental practice of the late Dr. Newton James Baxter of 171 Arlington Ave., Brooklyn, N. Y. For particulars address Mrs. N. J. Baxter.

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WANTED—Desire group, hospital or busy ethical connection. More than ten years experience. Relocating because present town too small. Specializing in X-ray and Oral Surgery. License: Ohio, California, Dist. of Columbia, Address J1 3039, American Dental Association, 212 E. Superior St., Chicago, Ill.

WANTED—Will pay high price for new and used Burs, Handpieces and Scraps. Address J1 3040, American Dental Association, 212 E. Superior St., Chicago, Ill.

WANTED—Dentist to lease for office, or office and home, four room apartment above physician's office in center needing dentist. $35.00 per month first year. Box 57, San Diego, California.

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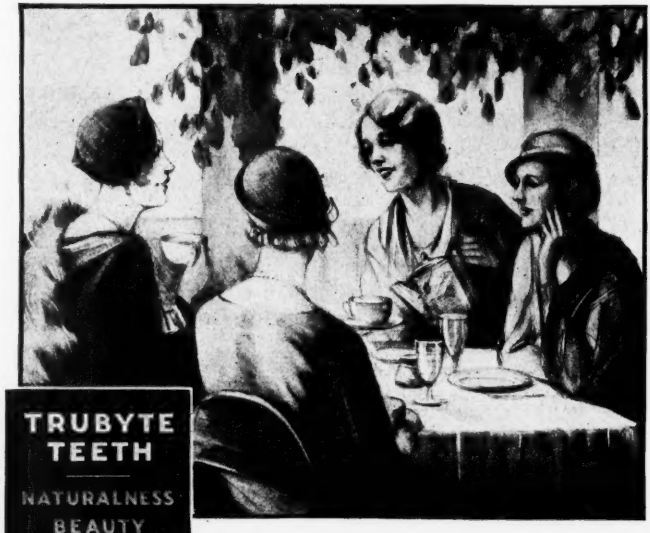

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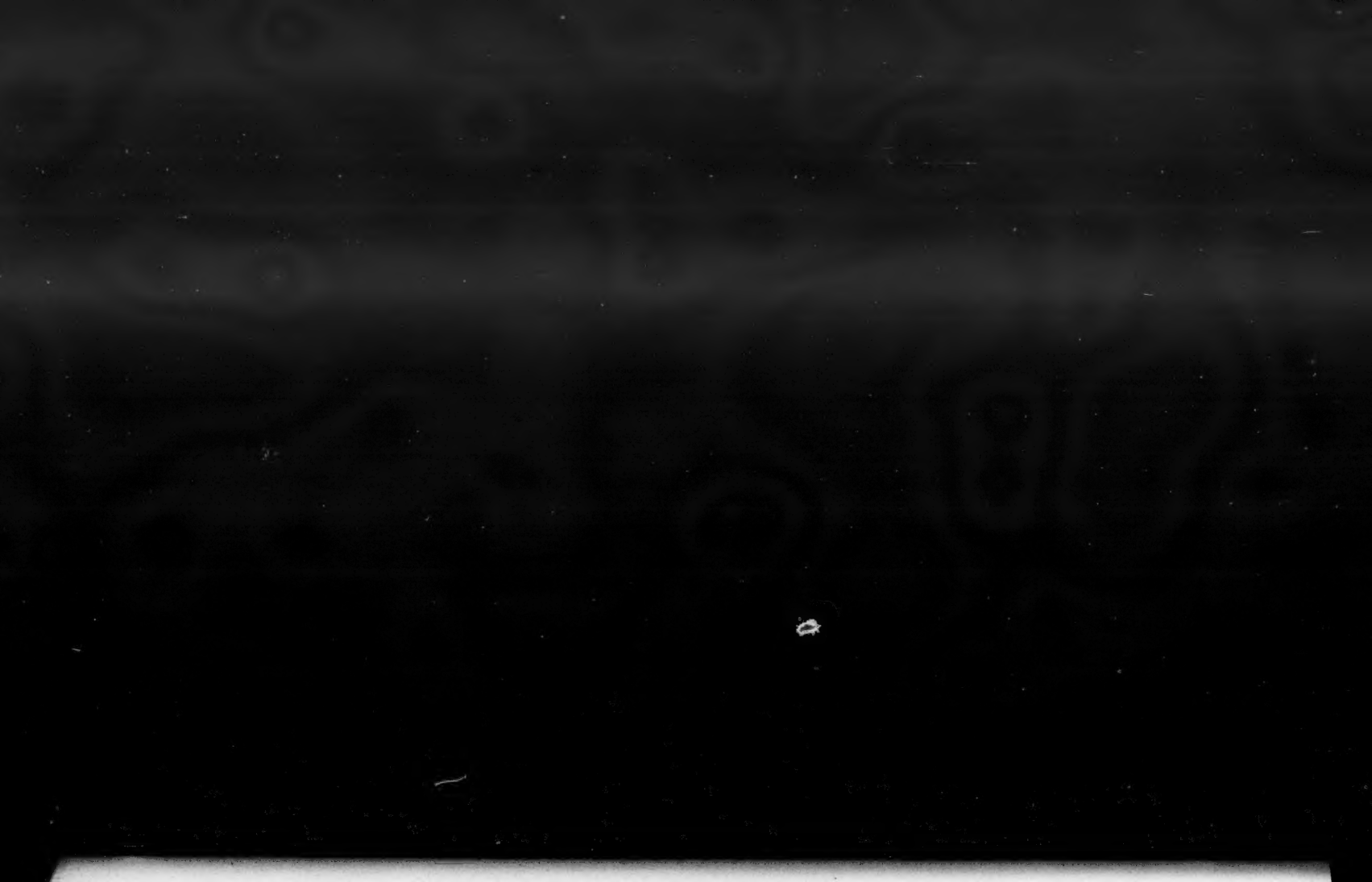
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